CHIEF SIGNAL OFFICER, U. S. ARMY.
THE
FARMER'S FRIEND
AND
PLANTER'S GUIDE.

PRACTICAL INFORMATION

FOR THE
FARMER, PLANTER AND FLORIST.

BY
JOHN V. PLOUGHSHARE.

PHILADELPHIA:
J. M. STODDART & CO.
HOW THE WEATHER-PROPHETS PROGNOSTICATE.

PROF. HENRY G. VENNOR'S SYSTEM OF FORECASTS.

"First and foremost, I examine myself respecting impressions formed intuitively from recent outdoor life. These I always find lurking in some corner of my mind, and ready to put themselves into shape when called for. On some occasions one of these in particular will loom up definitely above all others, and urge strongly its claims; while at other times a number present themselves, all equally plausible and likely. In rare instances I search and find no definite impressions formed, but all alike faint and flickering; and I may state here that on such occasions I feel considerable hesitation in hazard ing a forecast. My first step, then, is to write down on a sheet of paper, off hand, the main impression or impressions which naturally occur to me. This is what some people have called 'guessing.' It may be so; but if so, it is 'guessing' based upon outdoor—not closet—experience, and consists of natural inferences from Nature's laws. The forecast, however, thus written down is not yet to be settled upon as the proper one; other steps are necessary. The next is to draw up from field notes an abstract of the actual weather experienced during the whole summer, noting carefully every leading feature. Has it been a year of drought, rain, heat, or cold? Has it been marked by severe storms, or by calm, equable weather? All are carefully noted, and averages are taken of temperature, rainfall, storms, etc. Newspaper clippings, covering the length and breadth of the Dominion, are next studied, and the weather-items sorted and systematically arranged for further reference. Now, from all these data, and guided by past experience in such matters, I write off another—a No. 2—forecast, in the preparation of which I do not allow myself to be in the slightest degree influenced by the first, or No. 1, forecast. Next, setting these two forecasts aside and obliterating them entirely, if possible, from my mind, a third is prepared in the manner following: Diagrams of the weather of some thirty years are spread out and posted up on my study-wall. These at a glance show the general character of the past springs, summers, and autumns, and, further, the winters which have followed these. The diagram, say, of our last spring and summer is in my hand, and the problem to be solved is embodied in the question now asked me—viz.: What are our approaching autumn, winter, and spring to be like? Most assuredly, these will resemble in some respects some of those which have preceded..."
them. Sitting down in my easy-chair in the middle of my room, I gaze long and earnestly at that terrible array of weather-charts on my wall. After hours, perhaps days, of patient comparison, I find what appears to suit the case in hand—namely, one or more years that sufficiently resemble in their leading characteristics the one we are inquiring about. From the diagrams of these I draw out the last, or No. 3, forecast, and the hardest portion of my task is done. I now have three forecasts before me, perchance all similar, probably all diverse.

"No. 1 is the leading impression intuitively formed.

"No. 2 consists of natural deductions from the actual weather experienced during the past season.

"No. 3 is based upon analogy and a close comparison of former weather-charts.

"My manner of proceeding now is different in different cases. Are all forecasts fairly similar? Then I guide myself mainly by my first or leading impression. Are two only alike? Then I rearrange and form these into one. Are all different? Then I depend chiefly upon that naturally deduced from the action of the past six months. In this way are my general outlines formed. Further details, which I have several times attempted during the winter, have been chiefly deduced from the comparison of weather-charts of past years, but this has been found to be an insecure basis to build upon, and I have, as I deserved to, failed repeatedly in these attempts. But I here maintain that my general outlines have been in the main correct, although I have on several occasions spoiled the effects of these by subsequent attempts to give them in greater detail."

PROFESSOR TICE'S PREDICTIONS.

Professor Tice, in his Almanac, published at St. Louis, Mo., makes forecasts of the weather for every day in the year, based upon the theory that there are meteorological cycles that are fixed and determined by astronomical events. Those who believe the moon and the stars affect the weather will therefore gather round this oracle and listen eagerly to his predictions. But those who think it is somewhat more than human to predict with anything like certainty what a given day will bring forth, will prefer to anchor their faith on his Canadian fellow-prophet, or rest content with their own prognostications, or such as may be deduced from the bears, squirrels, and the Kentucky goose-bone.

In this Mr. Tice has done no more than the almanac-makers from the year One; and it is probable that except where he has been guided by scientific investigations, which may be accurate for cer-
tain periods, or when chances may happen to bear out his forecasts, his daily weather-ménu must be far from accurate.

But let the weathercock whirl in its socket, the dog keep up his grass diet, the weather-bureau hoist the storm-signal, the goose-bone flourish, the cirrus, cumulus, stratus, and nimbus clouds gather, Professor Tice publish his national almanac based on the theory that the weather is determined by Venus and Jupiter, still the world wags on.

A mackerel sky,
The wind will be high:
Then bring in the grain;
Close by there is rain.

DE VOE'S RULES FOR WIND AND WEATHER.

Mr. A. J. De Voe of Hackensack, N. J., gives the following ten short rules by the use of which a person can stand beneath his own vine and fig tree in any part of the northern hemisphere (north of latitude fifteen) and for hundreds of miles around him he can form an accurate opinion how the wind and weather are progressing:

1. When the temperature falls suddenly, there is a storm forming south of you.
2. When the temperature rises suddenly, there is a storm forming north of you.
3. The wind always blows from a region of fair weather toward a region where a storm is forming.
4. Cirrus* clouds always move from a region where a storm is in progress toward a region of fair weather.
5. Cumulus† clouds always move from a region of fair weather toward a region where a storm is forming.
6. When cirrus clouds are moving rapidly from the north or northwest, there will be rain in less than twenty-four hours, no matter how cold it may be.
7. When cirrus clouds are moving rapidly from the south or southwest, there will be a cold rain-storm on the morrow if it be summer, and if it be winter there will be a snow-storm.
8. The wind always blows in a large circle around a storm; and when it blows from the north, the heaviest rain is east of you; if it

* A form of cloud composed of thin filaments, the union of which resembles sometimes a brush, sometimes masses of woolly hair, and again a slender network.—Nichol.
† This form is somewhat elevated, and appears in large masses of a hemispherical form, or nearly so, above, but flat below, one often piled above another, forming great clouds, common in the summer, and presenting the appearance of gigantic mountains crowned with snow.—Webster.
blows from the south, the heaviest rain is west; if it blows from the east, the heaviest rain is south; if it blows from the west, the heaviest rain is north of you.

9. The wind never blows unless rain or snow is falling within one thousand miles of you.

10. Whenever a heavy white frost occurs, a storm is forming within one thousand miles north or north-west of you.

If any scientific gentleman has an idea that he can prove any of the above rules incorrect, I am ready and anxious to meet him.

WINTER RULES.

The following short rules may be of value to many if they will observe them:

1. When the wind shifts from the west to north and from north to east, it will rain in less than forty-eight hours, no matter how cold it may be.

2. When the wind shifts from west to south and from south to east, there will be a snow-storm, and, although it may be warm, the temperature will suddenly fall.

A. J. De Voe, Meteorologist.

Hackensack, Jan. 24, 1882.

A friend adds to the above: He does not think any one can or pretends to tell with certainty for a month ahead the kind of weather it will be on a certain day. Nor does he believe in “moon-signs” having any effect upon the weather, yet there are many who do. He says he believes in the barometer foretelling a change more certainly than anything else. His rule is: When the wind is west or south-west, and it “backs” to the south and south-east, with the mercury falling in the barometer, it is always followed by rain or snow; and if it goes east, much rain or snow (with the mercury falling); this rule has not missed once in his observations for nine years. He thinks it will pay any farmer or mechanic, whose occupation is out of doors, to keep a barometer and get used to its readings. Learn to read the clouds, say as in above rules; watch the wind and the barometer, and he will be rarely mistaken in these as a reliable combination for short periods of time.

W. P. H.

The dimness of the stars and other heavenly bodies is one of the surest signs of very rainy weather.

— Sheep huddle together at the approach of bad weather, and turn their tails toward its direction. Dogs and cats feel lazy at the approach of rain. The reason is, because the air is deficient in oxygen, and the damp depresses the nervous system.
A NEW EXPOSITION OF WEATHER-PHILOSOPHY.

The Cycle Theory—Illustrations of its Accuracy.

Are climatic changes governed by natural law? If so, is the tracing of that law within the power of science?

If the sun and moon, in their ever-varying motions around the earth, cause ever-varying tidal-waves in the great ocean of waters, they must produce similar but far greater and more striking results on the still vaster and more flexible ocean of the earth's atmosphere. Nor can it be reasonably doubted that the attracting power of the larger planets must exert a sensible effect on the great atmospheric ocean, though their influence be entirely unappreciable on the watery one.

These are the changeable factors of the weather-problem. That of the moon is repeated every nineteen years, very nearly; that of the planets, in cycles so vast as to make it practically impossible to make use of it in that form. It is the only complex or difficult part of the problem. All the others are simple and admit of an easy solution. As to the complex planetary one, it can only be solved by an application of the problem of the three bodies, in conjunction with a long and careful observation of the various several and combined effects of the planets. In this way only can science grasp the amount of perturbation resulting at different times, and apply it to the effects of the other known factors. It is a fact well known to astronomers that the earth, the sun and the moon occupy the same relative position, very nearly, every nineteen years. Consequently, whatever influence the sun and moon exert on the weather ought to be repeated, almost exactly, at each return of the cycle. This it really does, except so far as the result is affected by the varying complex effect of planetary perturbation. The amount of this perturbation will be in exact proportion as the attracting force of the planet operates in conjunction with one or more of the others, or in opposition to them, or is separate and independent in its action. The amount of this perturbing force can never be very great, and is constantly oscillating between its maximum and minimum results. Now, the chief weather-factors are the earth, the sun and the moon. They, being very nearly in the same relative position every nineteen years, must produce very nearly the same general phases of the weather, less the ever-varying effect of the perturbing influence of planetary attraction. It is evident, then, that the solution of the weather-problem depends on our ability to compute, at least approx-
imately, the amount of perturbing planetary influence exerted at any one particular time and place. This is certainly within the sphere of scientific achievement, nor can its accomplishment be long delayed.

CASES IN POINT.

It was during the unusually severe and long-continued winter of 1855-56 that my attention was first turned to the lunar cycle as a mode of determining the most prominent general phases of the weather for any future time. I found that 1856 was just four lunar cycles from the well-remembered hard winter of 1780. I was strongly impressed with this remarkable coincidence and its evident important significance. On further investigation I found that from 1780 to 1856 there had occurred every nineteen years a winter of remarkable severity. This gave me sufficient confidence in the cycle theory to venture the prediction that the winter of 1874-75, just nineteenth years from 1856, would be one of uncommon severity. It came, and was precisely such a one as its cycle demanded.

OTHER CYCLE-WINTERS.

I then began to look after other cycle-winters. I remembered that of 1841-42 was an uncommonly mild one, and that of 1842-43 one of unusual severity. I remembered also that on their next return, nineteen years after, they fully verified the cycle theory. I then predicted, and published in the newspapers, that 1879-80, the next cycle-winter to 1841-42, would be unusually mild, followed with a spring of unusual warmth and earliness—that 1880-81, the next cycle-winter to 1842-43, would be one of deep snows and intense cold, followed by a late spring. These predictions were all fully verified. But, remembering that the summer of 1843 was very warm, and distinguished for heavy rains that fell in July and the early part of August, I informed the people that they might expect something similar in the summer of 1881.

WHEN THE THEORY FAILED.

But it did not come. Instead of heavy rains, there was exceeding drought. June was more than usually wet, and made, as I predicted, good oat and hay crops. Early-planted potatoes were also good. But the corn crop failed, as it does not often fail in Chester county. The prediction failed, not through any unsoundness of the cycle theory, but because due consideration was not given to the very unusual amount of planetary perturbing influence exerted almost wholly in one direction during the past summer. It is worthy of note that during the great drought there were heavy rains in New England and on the eastern coast of the Southern States.
September and October there were immense floods in the Mississipi region. In August, when the drought was at its height here, the English harvest was nearly ruined by excessive rains. On the Continent and in the West Indies there were unprecedented floods during the great drought here. These examples show that drought and flood run in narrow veins—movable, we may suppose, in any direction by the perturbing power of planetary attraction.

WHY IT FAILED.

That this was the real cause of the change in the dry and wet areas is rendered almost certain by the fact that the relative situation of the planets in the summer of 1843 was as different as it could be from what it was during the summer of 1881. The truth is, there is a drought or dry period some time during almost every year. It is only when it occurs in midsummer and seriously injures the crops that it attracts any considerable notice. In 1843 there was not much rain in October and November, but as a drought then could do no injury, it excited no particular attention. In looking over the several midsummer droughts that are known to have occurred during the last hundred years, I have become fully convinced that they do not, in many instances, obey the cycle rule. It will therefore be necessary, in order to predict with any certainty the particular locality of a dry or wet area, to take into careful consideration the perturbing influence of planetary attraction as compared with that of some other dry or wet period. This can only be done with absolute correctness by the use of scientific appliances not now at my command.

J. William Thorne.

RAIN.—Almost the whole of the rain-water that enters the earth, whatever the quantity may be, penetrates the rocks below the surface. It does so to a variable, though perhaps nowhere a very great, depth, being conducted along through underground channels and passages, often narrow and curiously contorted, trickling down the splits and crevices of the harder rocks or gliding along on the surface of the tougher ones. Where interrupted by a belt of impermeable ground it will accumulate—where conveyed to the open air it will run off, obeying in all cases the law of gravitation. Occasionally, where the depth to which it passes is considerable, this is shown by the equable and often high temperature to which it rises; and this is not unfrequently the case where there is nothing in the contents of the water to indicate that it has undergone an essential change.
WINTER WEATHER-WISDOM.

Fair and Foul Weather, as Predicted by the Old-Fashioned Popular Meteorologists—The Signs in the Sky and Nature as Indicative of Climatological Changes.

THE COMING WEATHER

Has always formed a fruitful field for speculation, but it has only been of late years that the study of meteorological changes and phenomena has been reduced to a science and one of the useful arts. There are certain natural causes—the clouds no bigger than a man's hand—that, to careful observers, always indicate what is coming in a weather way for a short time ahead. From time out of mind a red sunset has been viewed as a precursor of fair weather, and a red sunrise a foreteller of a storm. A bright yellow sky at sunset uniformly denotes wind; a pale yellow, wet; and close observers do not need the testimony of Admiral Fitzroy to know that a dark, gloomy blue sky is windy, and a light, bright blue sky augurs fair weather. A high dawn indicates wind; a low dawn, fine weather. A gray sky in the morning presages fine weather.

SIGNS IN THE SKY.

One of the most beautiful cloud-formations, the mackerel sky, is well known to be denotive of a change. Oftentimes in a clear, warm summer day, on the ethereal, unclouded blue of the heavens, delicate tracings may be observed like a faint veil or cobweb. These invariably presage a decided change within two or three days. Oftentimes these present themselves in the form of strips or narrow bands extending from east to west or north to south over the entire aerial arch, the storm always coming from the direction pointed out by the clouds. Local signs go to show that in winter a dark blue cloud over a lake foretells a thaw. When the lower portion, however, is dark, and the upper part a gray color, snow may be expected. The aurora borealis, when very bright, is invariably followed by a storm, and, usually, intense cold.

GENERAL WEATHER-SIGNS.

Certain kinds of stones, which when rain is in the near future become damp and dark-looking, are excellent barometers. We recall, in this connection, a dark gray-colored stone in a shed, from which a laborer would successfully foretell approaching mild weather, rain, or snow in winter twenty-four hours and over beforehand.
ANIMAL INSTINCTS.

A dog eating grass has been often cited as indicative of coming rain. While we have repeatedly seen this verified, it is difficult to see according to what law of natural philosophy it operates. Swallows flying low in pursuit of insects, near the ground or water, is well known to be an excellent weather-guide. An old local weather-prophet whose predictions, based on the appearance of the clouds and natural objects, were wonderfully accurate, often formed his forecasts of rain by observing his chickens, which, he informed us, shortly before rainfall evinced unusual eagerness in quest of worms and other food. Crows clamor louder and frogs croak importantly on the approach of wet weather. Dogs and cats and other animals feel lazy when rain is near at hand, the reason being that the air is deficient in oxygen and the damp depresses the nervous system. Even fish, through some subtle instinct, appear to be aware of the close event of rain, and feed with unusual voracity. All anglers are aware of this, and can look back to their largest takes as having occurred at such times.

A CASE IN POINT.

Geese are unusually garrulous previous to a change of the elements. This fact was impressively brought before us while trout-fishing in the Dominion some years since. The day in question (the 14th of September), as well as the three or four preceding it, was warm, hazy, and delightful, with no warning clouds or any other apparent *avant-couriers* in the shape of weather-omens to denote an approaching change, unless it was the fish, which rose to the gaudiest of flies with savage eagerness, large ones leaping a foot out of the water in their endeavors to seize the feathered lures. But a large flock of geese, which appeared to dispute with the trout the possession of the pond, and which had frequently proved a source of annoyance while angling, were unusually boisterous and excited, with no apparent cause, cackling in the most vociferous manner, and flying to and from the pond, with loud gagging, at frequent intervals. "You'll hear from the weather to-morrow," observed a local disciple of Walton who acted as our chaperon; "that means a storm." And, sure enough, after the sun descended behind the pines with an angry frown, and, later on, the moon's bright disc was obscured by ominous-looking clouds, the temperature fell suddenly, and a three days' rain, a regular equinoxial, and very severe cold for the season, set in. So much for geese as weather-prophets.

The odor of the *Mephitis* is very pronounced before rain, owing to the heaviness of the atmosphere, which retains the scent in a highly offensive manner. The singing of the tree-toad is as certain
a sign that a change to falling weather is approaching, as the shrill song of the cicada vibrates with existing heat. A storm is often indicated in a manner not to be mistaken in the case of those troubled with rheumatism, while its approach is rendered at times certain by sleeplessness or unusual restlessness.

SIGNS IN THE SUN AND MOON.

A ring around the sun or moon stands for an approaching storm, its near or distant approach being indicated by its larger or smaller circumference. When the sun rises brightly and immediately afterward becomes veiled with clouds, the farmer distrusts the day. Rains which begin early in the morning often stop by nine in place of "eleven," the hour specified in the old saw, "If it rains before seven."

On a still, quiet day, with scarcely the least wind afloat, the ranchman or farmer can tell the direction of an impending storm by cattle sniffing the air in the direction whence it is coming. Lack of dew in summer is a rain-sign. Sharp white frosts in autumn and winter precede damp weather, and we will stake our reputation as a prophet that three successive white frosts are an infallible sign of rain. Spiders do not spin their webs out of doors before rain. Previous to rain flies sting sharper, bees remain in their hives or fly but short distances, and almost all animals appear uneasy. In fact, so numerous are the signs in the sky and nature that those at all given to observation, especially dwellers in the country, need no weather-bureau to inform them of near meteorological changes.

But the few of the many signs we have briefly instanced only apply to the immediate future, and have nothing to do with the far-seeing weather-prophets whose prognostications, also largely based on natural causes, peer into futurity a year in advance.

THE aurora borealis when very bright forebodes stormy, moist, unsettled weather.

— A haze around the sun indicates rain: it is caused by fine rain falling in the upper regions of the air; when it occurs, a rain of five or six hours’ duration may be expected.

— A halo round the moon is an indication of rain, it being produced by fine rain in the upper regions of the atmosphere.

— The larger the halo, the nearer the rain-clouds and the sooner rain may be expected.

— A halo round the sun has often been followed by heavy rains.
TO FORECAST THE WEATHER FOR SHORT PERIODS.

The following table and accompanying remarks will give the kind of weather probable to follow the entrance of the moon into any of her quarters, and will be found invaluable to the farmer during harvest-season and the gathering of the hay crop, and for all operations that need a knowledge of the state of weather likely to occur for a short period following the observations:

<table>
<thead>
<tr>
<th>TIME OF CHANGE.</th>
<th>IN SUMMER.</th>
<th>IN WINTER.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between midnight and 2 in the morning.</td>
<td>Fair.</td>
<td>Hard frost, unless the wind be S. or W.</td>
</tr>
<tr>
<td>Between 2 and 4, morning.</td>
<td>Cold, with frequent showers.</td>
<td>Snow and stormy.</td>
</tr>
<tr>
<td>Between 4 and 6, morning.</td>
<td>Rain.</td>
<td>Rain.</td>
</tr>
<tr>
<td>Between 6 and 8, morning.</td>
<td>Wind and Rain.</td>
<td>Stormy.</td>
</tr>
<tr>
<td>Between 8 and 10, morning.</td>
<td>Changeable.</td>
<td>Cold, rain, if the wind be W.; snow, if E.</td>
</tr>
<tr>
<td>Between 10 and 12, morning.</td>
<td>Frequent showers.</td>
<td>Cold and high winds.</td>
</tr>
<tr>
<td>At 12 o'clock, noon, and to 2 p.m.</td>
<td>Very rainy.</td>
<td>Snow or rain.</td>
</tr>
<tr>
<td>Between 2 and 4, afternoon.</td>
<td>Changeable.</td>
<td>Fair and mild.</td>
</tr>
<tr>
<td>Between 4 and 6, afternoon.</td>
<td>Fair.</td>
<td>Fair.</td>
</tr>
<tr>
<td>Between 6 and 8, afternoon.</td>
<td>Fair, if wind N. W.; rainy, if S. or S. W.</td>
<td>Fair and frosty, if N. or N. E.; rain or snow, if S. or S. W.</td>
</tr>
<tr>
<td>Between 8 and 10, afternoon.</td>
<td>Fair, if wind N. W.; rainy, if S. or S. W.</td>
<td>Fair and frosty, if N. or N. E.; rain or snow, if S. or S. W.</td>
</tr>
<tr>
<td>Between 10 and 12, afternoon.</td>
<td>Fair.</td>
<td>Fair and frosty.</td>
</tr>
</tbody>
</table>

**REMARKS.**

1. The nearer the time of the moon’s change, first quarter, full, and last quarter to midnight, the fairer will the weather be during the seven days following. The space for this calculation occupies from 10 at night till 2 next morning.

2. The nearer to midday these phases happen, the more foul or wet weather may be expected the next seven days. The space for this calculation occupies from 10 in the forenoon to 2 in the afternoon.

3. The phases happening from 4 till 10 in the afternoon may be followed by fair weather, but this mostly depends upon the wind.

4. If a storm arises from the east on or immediately preceding the time of the spring equinox, or from any point of the compass near a week after, then, in either of these cases, the succeeding summer is dry four times out of five; but if a storm arises from the S. W. or W. S. W. on or just before the spring equinox, then the summer following is wet five times in six.
THE PRACTICAL USE OF METEOROLOGICAL REPORTS AND WEATHER MAPS, AND HOW THEY ARE MADE.

Readers of daily papers are familiar with what are called "Weather-Reports" or "Probabilities," and the maker of these is usually styled "Old Prob." The following will show how these reports are gathered from every section of the United States. They are of immense value to farmers, merchants, seamen, and all whose business-undertakings are affected by the weather.

In pursuance of the duty imposed upon the Secretary of War by the law providing for the announcement by telegraph and signal of the approach and force of storms, and under his direction, the office of the Chief Signal Officer of the Army, at the War Department, causes meteorological observations and reports to be made, daily and nightly, at 55 stations.

The office Division of Telegrams and Reports for the Benefit of Commerce is organized for the preparation, receipt, and use of these reports.

At every station three observations are taken daily, at the same moment of actual (not local) time for all stations, by the Observer Sergeants of the Signal Service. The reports are immediately telegraphed to the office of the Chief Signal Officer at Washington.

By a carefully arranged system of telegraphic operation copies of the full reports of all stations thus transmitted to Washington, or of portions of them, are sent at the same time to many of the Signal Service stations in principal cities and towns.

At each station so receiving a tabular report one or more Bulletins are published. The observations are made synchronously at the different stations, at the exact hours, 7:35 A. M., 4:35 P. M., and 11:35 P. M., Washington time.

The full reports from all stations are telegraphed to, and received at, Washington, translated from cipher and published in the form of Bulletins of Reports by the hours of 9 A. M., 6 P. M., and 1 A. M., respectively (Washington time). The Bulletins of Reports are designated as follows: That published at 9 A. M., the "Morning Report;" that published at 6 P. M., the "Afternoon Report;" and that published at 1 A. M., the "Midnight Report." The Bulletins, wherever published, at Washington or elsewhere, exhibit the following particulars—viz.: Height of Barometer; Change since last report; Thermometer; Change in last 24 hours; Relative Humidity, in per cent.; Direction of Wind; Velocity of Wind, in miles per hour; Pressure of Wind, in pounds per square foot; Force of Wind;
“OLD PROBABILITIES.”
Amount of Cloud; Rainfall since last report, in inches and hundredths; and State of Weather.

The morning and afternoon reports (Bulletins) are posted at each of the local Signal Service offices, and at a number of other public places in the cities and towns to which they are transmitted.

They are always open for examination. At the more prominent stations, and those in principal cities, large Weather-Maps are also posted every morning, exhibiting, by means of changeable symbols, the reports of the morning observations at the different stations. The midnight report (Bulletin) is gratuitously furnished to every morning newspaper published in the city at which a station of observation may be which will insert it in its columns. The morning report is also delivered to afternoon papers in time for publication.

The Observers at each station are instructed to afford every facility to the press and to the public for the earliest receipt and most extended use of the reports and information at their respective offices.

In addition to the Bulletins, a statement of Synopses and Probabilities is prepared at the office of the Chief Signal Officer, and thence issued thrice daily. It is immediately furnished to the Associated Press, by which it is telegraphed to all its agencies throughout the country.

The Synopses and Probabilities, with which the public is familiar through the columns of the different newspapers, are issued from the office of the Chief Signal Officer at 1 A. M., 10 A. M., and 7 P. M., daily.

In the study of local Probabilities the student should make sure that he has before him (as in the columns of the local newspapers) the latest Synopses and Probabilities issued at Washington. To be sure of such facts, he must notice the hours at which they are dated from the Office in Washington. The Midnight Reports, dated at 1 A. M. of each day, ought to be found in the morning newspapers of that day. The Morning Report, dated at 10 A. M. of each day, is furnished in time for the afternoon and evening papers.

In addition to the Weather Bulletins and the "Synopses and Probabilities," a graphic weather chart or map is issued thrice daily from the office of the Chief Signal Officer of the Army, at the War Department. To those who know how to use them, all of these republications offer valuable help in estimating the probable character of the weather at any station, or over any district, during the following day, and often for a still longer period. The bulletins and graphic charts, properly filled, convey the same information, with this difference: while the former merely tabulates the reports alphabetically, the latter reveals to a single glance of the eye a synoptical view at once of the meteoric conditions at the different
stations, and of the deductions thence to be made as to the conditions of the atmosphere then extending over the continent.

The graphic charts are of additional value, from the fact that it is often possible to trace upon them, in lines, the progress of storms or the change of meteoric condition (as the movement of an area of high or low barometer) from report to report, and thus, by considering the past, and by applying laws and generalizations reasonably well established, to estimate more easily the “Probability” of the future.

ABBREVIATIONS USED IN THE PRESS REPORTS.

It may be well to state here that, in the Weather Synopses and Probabilities emanating from the Signal Office, different parts of the country are thus designated:

Maine, New Hampshire, Vermont, Massachusetts, Connecticut, and Rhode Island are alluded to as the New England States or the North-east, or simply as the Eastern States.

New York, New Jersey, Pennsylvania, Maryland, District of Columbia, and Virginia, as the Middle States, or sometimes as the Middle Atlantic States.

North Carolina, South Carolina, Georgia, and Northern and Eastern Florida, as the South Atlantic States.

Western Florida, Alabama, Mississippi, Louisiana, and Texas, as the Gulf States.

Sometimes the Gulf States, the South Atlantic, Virginia, Tennessee, Kentucky, and Arkansas, are grouped together as the Southern States.

The Lower Lakes, when used, means Lake Erie and Ontario.

The Upper Lakes are Lake Superior, Huron, and Michigan.

The North-west, popularly, means the country lying between the Mississippi and Missouri Rivers.

The South-west means Texas, Indian Territory, and New Mexico.

Pacific Coast or Pacific States includes California, Oregon, and Washington Territory.

The Ohio Valley includes the belt of country about two hundred miles broad from Pittsburg to Cairo.

The Mississippi Valley includes a belt of about the same width from Vicksburg to Davenport.

The extensions “from Missouri to Ohio,” etc., etc. refer to areas reaching to and including the central portions of the States named. Thus, a report “Westerly winds extending from Iowa to Pennsylvania” would signify that those winds would be felt in the interior of those States as well as over the territory lying between them of the respective States.

In “the Coasts, etc.” is included the land between the coasts
and the parallel range of coast hills or mountains. In Texas, Louisiana, and Northern Florida a belt of land extending a hundred miles inward would be included.

Winds are said to blow from N. E. when they are generally included within the quadrant from N. to E., etc., and similarly for other directions.

**THE ATMOSPHERIC PRESSURE.**

It is generally well understood that the height of the mercury in the barometer tube is a simple and direct measure of the intensity with which the atmosphere is at that moment pressing down upon the basin of the barometer, and upon the neighboring region of the earth; and not only is the pressure downward, but equally so is it exerted upward and horizontally in all directions.

The average height of the barometer at the level of the sea, on the Atlantic coast of the United States, does not vary much from 30.00; on the Western plains it rises to 30.2 in the winter. It diminishes as we approach the Arctic regions.

**THE WINDS AND THEIR LAW.**

Whether considered as the indices or as the causes of coming changes of weather, no phenomenon is more important than that of the winds. Upon the direction and force of the winds some meteorologists lay very great stress in every attempt at storm-forecasting.

The resulting movement of the air, modified by the forces of inertia and friction, and by the rotation of the earth and local obstructions, is converted into the local winds whose directions are indicated by the arrows upon the maps, and whose velocities are given in miles per hour. These winds may be called local winds, as distinguished from the general winds in any section, and from the great currents of air to be hereafter spoken of; the general winds appear to be primarily dependent upon the existence and position of the areas of low and high pressure; the great currents, spreading, as they do, over whole continents and encircling the earth, are largely influenced by, if not entirely dependent upon, the earth's axial rotation.

If the earth were not in rotation on its axis, the winds would uniformly blow in straight lines outward from the centre of every area of high barometer toward the surrounding localities of lower barometer. Observation, however, has long since clearly shown that in this hemisphere, within any area of high pressure, the winds will be found to be not only blowing away from the centre (outward), but also to be deflected toward the right hand as they move forward.
Observation has also shown, with equal clearness, that in this hemisphere, within any area of low pressure, the winds will blow toward the centre (inward), and will also be deflected toward the right hand as they move forward. This deflection to the right has been demonstrated by Mr. Wm. Ferrel of Cambridge, Mass., to be a mathematical necessity arising from the influence of the earth's diurnal rotation, which causes everything moving on its surface to deflect slightly to the right in the northern hemisphere, and to the left in the southern hemisphere. This force, by which, to give a popular illustration, a railroad train is made to bear more heavily on the right-hand rail of the track along which it advances, is the key to the explanation of many phenomena in connection with atmospheric and ocean currents. By considering the influence of this deflection it becomes possible to construct the following table, which shows which winds will generally prevail on each side of areas of high and low pressure:

<table>
<thead>
<tr>
<th>The observer being—</th>
<th>Low pressure.</th>
<th>High pressure.</th>
</tr>
</thead>
<tbody>
<tr>
<td>On the N. side........</td>
<td>N. and E. ....</td>
<td>S. and W. ....</td>
</tr>
<tr>
<td>On the N. W. side....</td>
<td>N. W. and N. E.</td>
<td>S. E. and S. W.</td>
</tr>
<tr>
<td>On the W. side.......</td>
<td>W. and N. ...</td>
<td>E. and S. ....</td>
</tr>
<tr>
<td>On the S. W. side.....</td>
<td>S. W. and N. W.</td>
<td>N. E. and S. E.</td>
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<tr>
<td>On the S. side........</td>
<td>S. and W. ....</td>
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<td>On the S. E. side.....</td>
<td>S. E. and S. W.</td>
<td>N. W. and N. E.</td>
</tr>
<tr>
<td>On the E. side........</td>
<td>E. and S. .....</td>
<td>W. and N. ....</td>
</tr>
<tr>
<td>On the N. E. side.....</td>
<td>N. E. and S. E.</td>
<td>S. W. and N. W.</td>
</tr>
</tbody>
</table>

Vertical as well as horizontal systems of winds, depending upon the disturbances of equilibrium continually taking place in the region of the clouds, always exist in connection with the ordinary horizontal gales; these are, in fact, a most prominent feature of tornadoes and water-spouts.

The force of a local wind at any point, and at any moment, certainly depends primarily upon the relative barometric pressure at points in the vicinity, and upon the rapidity with which the pressure has been or at that moment is changing; but the force and direction of the wind at any station are also very materially influenced by the character of the ground in the immediate and distant neighborhood. The wind which on the ocean would blow with a certain velocity, will have but one-half or one-third of that velocity when blowing over hilly country. This is due to the lesser friction on the ocean,
and this frictional resistance in two different ways disturbs the direction of wind:

1. If, for example, there is a north wind blowing very generally over a lake of elliptical shape, such as Lake Michigan, and over the neighboring country, then on the central line of the lake a strong north wind will be experienced, and a feeble one at the points on land far removed from the shore; but at points on the north-west and south-east shores of the lake a north-west wind will be experienced, while a north-east wind will be observed on the north-east and south-west shores. Similarly, if a south wind blows steadily over the Southern States and coast, it will, to observers on the coast, appear as a south-west wind, and a north wind will be changed into a north-east wind; and this, too, independently of the additional influence exerted by the earth's rotation, which should in this present example increase the extent of those changes, in accordance with the law above given, as first deduced in all its generality by Ferrel.

2. The friction of the earth's surface has a greater influence upon strong than upon feeble winds, and thus does more to retard the tangential than the centripetal motion of the air in the neighborhood of an area of low pressure. Consequently, in severe storms on land the wind is found to be directed more nearly toward the central area of the disturbance than in oceanic storms. Thus in tornadoes the inward and upward motions predominate over the tangential.

Precisely as the velocity over water is greater than over land, so is the velocity far above the earth's surface greater than lower down. Balloon voyages show occasional velocities of one hundred miles per hour. The severest gales on the earth's surface rarely exceed eighty-five miles, though doubtless this has been exceeded in certain tornadoes and momentary gusts, etc. The currents only a few hundred feet above the earth have frequently twice the velocity of those observed on the surface, as shown by observations of the velocity of passing cloud-shadows.

The destructive power of a wind, or its power to overthrow or move any body, is the difference in the pressure on opposite sides of the body. In steady winds this difference depends not only upon the velocity of the wind, but equally on the shape of the resisting body. Those bodies offer least resistance in which (as in fishes, the hulls of ships, bridge-piers, etc.) the hinder portion receives the backward pressure of the fluid that presses up against it, thus permitting as little approach to a vacuum as possible. In the case of sudden gusts the resisting body receives the whole force of the impulse precisely as a blow. The atmosphere, though so light, is not devoid of mass and inertia. Air in motion at the rate of one hun-
dred miles per hour strikes obstacles with a force equal to that which the same volume of water would exert if moving at the rate of three and one half miles hourly.

THE TEMPERATURE.

The thermometric changes over all parts of the earth's surface are mainly dependent upon the apparent annual and daily motions of the sun and the grand atmospheric currents.

As fluids and gases are both bad conductors of heat, the distribution of heat in the atmosphere is effected most largely by the winds or by convection, just as in the ocean it is effected by means of the grand aqueous currents.

Aqueous vapor visibly suspended in the air, as haze or cloud, serves as an effectual and double shield against the radiation of heat from the earth, and also against the sun's rays themselves. Even the invisible particles of vapor floating in the atmosphere, however rare, present an obstruction to the free passage of heat of low intensity, or obscure heat much in the same way as haze and smoke obstruct the light, or as stones in the bed of a water-course retard the flow of that fluid. On the most Alpine situations, where, on account of their loftiness, much less aqueous vapor is interposed between them and the cold stellar regions, radiation is least impeded, and, consequently, when exposed to the direct rays of a serene midday sun the heat is intolerable, while at night the unimpeded radiation produces a corresponding extreme of cold. The temperature observed is the difference between the heat given out and that received in a definite interval of time.

The temperature of the lower air depends primarily, indeed, upon the amount of heat poured down upon the earth by the sun, and the amount absorbed by the air, as the earth radiates its heat back into space; but, in addition to this, the heat held latent in the vapor diffused through the air is at times liberated by the condensation of the vapor into fog, rain, and snow, and then it becomes sensible to the thermometer. During the day a moist atmosphere will become warmer than one that is dry, and during the night the radiation of heat through a moist atmosphere will be less than that through a dry one. During cloudy or hazy weather the radiation is almost wholly cut off, so that a very uniform temperature prevails between the earth and the bottom of the lowest layer of clouds. On the other hand, sufficient heat is absorbed (i.e., becomes latent) in the process of evaporation to materially reduce the temperature of the air; thus it is that "drying winds" are also "cooling." An increase of barometric pressure, by increasing the capacity of the
air for moisture, serves to stimulate evaporation and temporarily reduce the temperature. A diminution of pressure and consequent expansion of confined air produces a lower temperature and diminished capacity for moisture, until the condensing vapor gives out its latent heat.

Examination of the weather-charts will show that the temperature varies much less over cloudy than over clear districts; that it varies less in low than in elevated regions; that it is warmer on one side of an area of low or high pressure than the other, and generally warmer in advance of any storm-centre and colder in the rear.

THE MOISTURE (RELATIVE HUMIDITY).

In all localities on the globe, and at all times, moisture, in greater or smaller quantities, exists in the atmosphere, which is, consequently, never absolutely dry. Intervals or interstices occur between the particles of the dry air, which are partially filled with this ever-present aqueous vapor. The more numerous such intervals are, the greater is the capacity of the air for moisture; and when these intervals are so full of vapor that the air is incapable of containing or holding any more, it is said to be saturated.

An increase of heat increases the capacity of the air for moisture; while, on the contrary, a fall of temperature is the occasion of a corresponding diminution of the capacity for vaporous matter.

The important element of moisture is given in the Signal Service Bulletins, not in the absolute quantity in which it is found at any given place, but as a percentage of full saturation, or what, in the language of meteorologists, is expressed by the term Relative Humidity. This must not be confounded with absolute humidity, which is a very different thing. For, supposing the temperature of the air at a given place to be 40° and fully saturated with aqueous vapor, and then to be suddenly raised to 50° without any addition being made to its store of vapor, its absolute humidity would in each case be exactly the same, but in the former case the weather would, in popular language, be very damp, and in the latter case very dry. In the former case the relative humidity (or humidity, as it is often simply called) would be very high—i.e., 100 per cent.; in the latter very low—i.e., 50 per cent.

Watery vapor dissolves in air very much as salt dissolves in water, and as the salt is deposited in crystals whenever the water becomes fully saturated, so, whenever the air becomes fully saturated with vapor, the latter is deposited on the earth in the form of mist, dew, and rain if the temperature be high, or as frost, hail, or snow-crystals if the temperature be low.
One cubic foot of air, having a temperature of 50°, and under a uniform barometric pressure of 30.00 inches, and fully saturated will hold 4.28 grains of water according to Glashier's tables. If under these conditions, the temperature or the pressure of the air is lowered, there will result a deposition of a portion of the water, and that either in the form of fog, dew, rain, frost, or snow and hail. On the other hand, if there is an increase in the temperature or the pressure, the air becomes capable of holding a larger quantity of vapor, and ceases to be fully saturated. Relative humidity expresses the proportion of vapor actually contained in the air compared with what the air could contain.

Certain winds will be found to be moister than others. The west and north-west are generally the driest in the Mississippi Valley. Dry air almost always predominates on the leeward side of mountain-chains, and is the characteristic of the plains and plateaus west of the Mississippi Valley. Dryness will be found attending clearing-up weather. Dampness or a large increase of relative humidity accompanies threatening weather as an almost invariable premonition. Ascending currents of air also increase in dampness; descending currents grow drier.

The smoky haze which spreads to a great distance when extensive forest fires prevail is composed of minute atoms of charcoal, which possess the singular property of attracting moisture to themselves, and thus perpetuating dry weather.

THE CLOUDS AND THEIR INDICATIONS.

By entering graphically on the map the general features of the weather and sky, we complete the detailed representation of the atmospheric condition. The clouds by their kinds and changes are indices to the relative temperature, moisture, and pressure existing at high altitudes; by their motions they indicate the nature of the prevailing current of air, showing whether it is from the tropics, and hence likely to be warm, or from the polar regions, and cool.

The ascent of expanding warm air gives rise to the *cumulus* clouds, whose flat bases are all on a pretty uniform level. These subside and dissolve when they cease to be fed by rising currents of moist air: the thickness of the cumuli from base to peak is less in cold dry weather than on warm moist days. The *cirrus* clouds are probably formed independently by the radiation of heat outward into the highest regions of the atmosphere, in which case they are composed of snow-flakes or of spiculae of ice; and they are also formed of the remnants of the storm-clouds, in which case they are generally composed of warmer vapor. The strong winds that at-
tend areas of low barometer give rise, through the influence of friction, etc., as before stated, to ascending strata of moist air, in which, by expansion or cooling, as the case may be, are produced the scud- and rain-cloud, of which there is a fine example in the easterly rains of the Atlantic coast. This scud-cloud, which is at first like a cumulus of irregular shape, subsequently spreads into broad sheets of stratus and nimbus.

Two or more layers of clouds almost invariably coexist wherever extended rain-storms prevail, the upper layer stretching far in advance of the lower, but descending and merging into the lower over the area on which rain is falling most abundantly. In the rear of this area cumulus clouds are abundant. A general survey of the map will show that cumuli or the cirri first mentioned in the preceding sentence are not inconsistent with fair and clear weather, as these terms are popularly used. An increased accumulation of large cumulus clouds may become cloudy weather, but does not generally presage the extended storms of winter. The cirrus of the second class, sometimes called cirro-stratus, almost always precedes at some distance any extensive rain-storm, whether of winter or summer. The stratus will generally be found to be reported in connection with threatening weather at the different stations.

The classification of clouds into cumulus, cirrus, etc. is indicated on the plate facing page 16.

STORMS AND CYCLONES.

Whether of snow, rain, or wind, whether of greater or less violence, storms and cyclones have much similarity in their general features and behavior. Strong contrasts of temperature and of pressure, in contiguous currents of warm and cold air, mark the progress and also the origin of a storm. The Gulf Stream and the adjacent areas of colder water, the land bordering on oceans or lakes, whether frozen or open, mountains and plains and river valleys, are examples of regions over which moist and dry or warm and cold strata come in contact. But even more important, though imperfectly understood, are the sudden changes that take place overhead, which are apparently due to the elevation of moisture into the higher regions of the atmosphere. The storms that visit the United States may be described as of four types, as follows:

1st. The West India cyclones, originating in the southern regions of the zone of easterly trade winds, and generally east of the Windward Islands, possibly even in the Meteorological Torrid Zone, or equatorial belt of calms and rains. A very low pressure and large humidity mark their central region. Toward this the winds blow
from all points, and, deflecting to the right, pursue their spiral course inward and upward; at least, this is the only satisfactory explanation that has yet been offered for the various phenomena. The moisture brought by this wind condenses as the pressure is reduced, and clouds are formed, with heavy rain.

Around the centre of a cyclone an upward current is supposed to exist, and high above are formed the cirrus clouds, which stream far away in advance on the upper currents of air. These storms are carried to the north and west until they pass into the Meteorological Temperate Zone, where the prevailing south and west winds control their motions. This generally happens on or opposite the South Atlantic coast, and as the storms then pursue a course nearly parallel with the Gulf Stream, with its attendant band of warm, moist air, they produce heavy easterly gales along our Atlantic coast, and finally are lost in the Northern Atlantic, but occasionally, doubtless, reach Iceland and the coast of Great Britain.

2d. The autumn, winter, and spring rains, which generally first announce themselves on the south-west or western plains of this country, may be regarded as disturbances originating on the northern confines of the Tropical Zone and on the Pacific slope (as distinct from those of the preceding class that originate in the West Indies).

From the area of high pressure on the Pacific coast of Central and North America a volume of moist air is forced up over the Sierra Nevadas and Rocky Mountains; its moisture is deposited, and a wave of rarefied but probably dry air is started on its north-east or eastern course. No sooner does this arrive, as a wave of low barometer, over the comparatively moist air of the Mississippi Valley, than, by relieving the surface stratum of its pressure, there at once begins the condensation of its moisture, which process, if the air is not too dry, goes on rapidly increasing.

Local currents arising in this surface stratum of air feed the central area of condensation, which soon becomes hazy, and then cloudy, until rain begins. While the general progress of the storm-centre will be north-eastward, yet it is evident that wherever the moistest air exists, there the condensation will take place the most rapidly, there the barometer will also fall the most rapidly, and thither the storm will be strongest drawn. Such storms naturally, therefore, move very rapidly up toward the lakes, and hang tenaciously over them, and move slowly away from them. In winter their course is eastward, in the early autumn north-eastward.

The temperature of the upper regions must decide whether rain or snow will attend these storms. Their advance is almost inva-
riably heralded by an increase of temperature, due apparently to latent heat evolved by the condensation going on in the circumjacent and superior air and radiated downward to the earth, and to the increased facility with which the saturated air on the surface absorbs the heat radiated by the earth.

3d. Well-defined, though generally weak disturbances, have been observed to pass from the north to the south, or the north-west to the south-east, but these are probably rare in the United States, and probably occur only in midwinter, when the north-east winds and high pressure in British America are exceptionally strong. Continuous snow, succeeded by cold, dry weather, characterize these storms; and such a one, on one occasion, after striking the coast of Alabama and turning eastward, ascended the Gulf Stream to the north-eastward, thus coursing around the area of high pressure, that had then pushed southward over the lake region.

4th. The storms which are generally confined within the United States are the northerns, tornadoes, and thunder-storms. The latter are generally spread over a very narrow space, so that they may at times pass between the stations from which our reports are received. These storms evidently originate in the lower cloud-stratum in local but intense differences of temperature, moisture, and pressure, and are believed in general to prevail only on the western side or in the rear of areas of high pressure. The gyratory movements of these small storms depend upon local currents and resistances, rather than on the earth’s rotation; they may, therefore, gyrate either toward the right or the left. In these storms the cumulus clouds are particularly remarkable for their height, and the cirrus clouds for their small extent. The presence of a surface area of dry air is oftentimes sufficient to dissipate these storms, or to cause them to retire into the cloud regions. Similar storms form over mountain-tops, and are experienced by balloon voyagers when the air is quite undisturbed below. Several such smaller storms frequently simultaneously coexist, pursuing parallel paths circulating with the general winds about the continental areas of low barometer, and the area of local storms thus corresponds very nearly to what would be an area of general rain were the temperature lower over the region. The lightning which accompanies these storms is the effect of the concentration upon large drops of water of the electricity previously distributed throughout the invisible vapor; it is considered as a result, not a cause, of storms.

5th. It has been noticed that there is a tendency in the spring and summer toward an accumulation of barometric pressure over the middle and eastern Atlantic States. When this area of high
barometer moves eastward, the easterly winds on its south side, driving on to the coast from Maryland to Massachusetts, produce clouds, and occasionally severe storms of small extent, which are driven north and westward until broken up among the Appalachian Mountains.

In general, areas of high barometer prepare the way for the succeeding low pressure and high winds, and have been not inaptly termed *storm-breeder*.

**THE PREDICTION OF STORMS.**

The wind is that element which most affects the commercial interest of the country, and, in forecasting the approach of a storm, a student at present naturally gives his principal attention to this element; the prevalence of fog, rain, or snow, and the temperature of the air, may, however, be estimated in a general way. He must call to his aid all such knowledge as is offered by the preceding brief statement of the prominent meteorological principles, such local laws as he may know to hold good for the districts in question, and such more general laws as have been deduced by the study of eminent meteorologists.

The prediction of an extended storm for any portion of the country is reduced to the determination of the path pursued by the central area of low pressure, and the rapidity with which this will extend its influence in any given direction.

The general distribution of the principal masses of cirrus and cirro-stratus clouds, combined with the distribution of the areas over which the temperature and pressure have risen or fallen with abnormal rapidity, will safely indicate, at least for the winter months, the immediate region into which the storm will pass, and occasionally even give a premonition of its breaking up into two portions, each drawn in different directions.

The more violent winds generally follow in the rear and on the south side of the advancing area of lowest pressure; those that precede the progress of that area may often be more dangerous, however, because of the accompanying rain, fog, etc. The latter winds are preceded by the cirrus and threatening storm-clouds; the rain that accompanies or follows these generally abates, and thus gives warning of the strong clearing-up winds.

The rapidity of progression of the area of cloud and rain varies from fifteen to sixty miles in an hour, the actual velocity varying with the influence of moisture, as explained in a previous section.

The average velocity of the currents, which determine the general direction of the progress of the nucleus of the storm, varies
from twenty to forty miles hourly, and rarely reaches the higher limit.

The inertia of the air conspires with the friction of the winds on the land to delay the movements in the continental storms much behind the corresponding phenomena in oceanic storms.

LEADING PRINCIPLES OF REDFIELD'S THEORY OF STORMS, AS DEVELOPED BY HIM FROM 1831 TO 1857.

That all violent gales or hurricanes are great whirlwinds, in which the wind blows in circuits around an axis either vertical or inclined; that the wind does not move in horizontal circles, as the usual form of his diagrams would seem to indicate, but rather in spirals toward the axis, a descending spiral movement externally and ascending internally.

That the direction of revolution is always uniform, being from right to left, or against the sun, on the north side of the equator, and from left to right, or with the sun, on the south side.

That the velocity of rotation increases from the margin toward the centre of the storm.

That the whole body of air subjected to this spiral rotation is at the same time moving forward in a path at a variable rate, but always with a velocity much less than its velocity of rotation; being at the minimum hitherto observed as low as four miles, and at the maximum forty-three miles, but more commonly about thirty miles per hour, while the motion of rotation may be not less than from one hundred to three hundred miles per hour.

That in storms of a particular region, as the gales of the Atlantic or the typhoons of the China seas, great uniformity exists in regard to the path pursued; those of the Atlantic, for example, usually issuing from the equatorial regions eastward of the West India Islands, pursuing at first a course toward the north-west as far as the latitude of 30 degrees, and then gradually wheeling to the north-east, and following a path nearly parallel to the American coast, to the east of Newfoundland, until they are lost in mid-ocean; the entire path when delineated resembling a parabolic curve, whose apex is near the latitude of 30 degrees.

That their dimensions are sometimes very great, being not less than one thousand miles in diameter, while their path over the ocean can sometimes be traced for three thousand miles.
That the barometer at any given place falls with increasing rapidity as the centre of the whirlwind approaches, but rises at a corresponding rate after the centre has passed; and finally, that the phenomena are more uniform in large than in small storms, and more uniform on the ocean than on the land.

GENERALIZATIONS, BY PROF. J. P. ESPY.

1. The rain- and snow-storms, and even the moderate rains and snows, travel from the west toward the east in the United States during the months of November, December, January, February, and March, which are the only months to which these generalizations apply.

2. The storms are accompanied with a depression of the barometer near the central line of the storm, and a rise of the barometer in the front and rear.

3. This central line of minimum pressure is generally of great length from north to south, and moves side-foremost toward the east.

4. This line is sometimes nearly straight, but generally curved, and most frequently with its convex side toward the east.

5. The velocity of this line is such that it travels from the Mississippi to the Connecticut River in about twenty-four hours, and from the Connecticut to St. John, Newfoundland, in nearly the same time, or about thirty-six miles an hour.

6. When the barometer falls suddenly in the western part of New England, it rises at the same time in the valley of the Mississippi, and also at St. John, Newfoundland.

7. In great storms the wind for several hundred miles on both sides of the line of minimum pressure blows toward that line directly or obliquely.

8. The force of the wind is in proportion to the suddenness and greatness of the depression of the barometer.

9. In all great and sudden depressions of the barometer there is much rain or snow; and in all sudden great rains or snows there is a great depression of the barometer near the centre of the storm, and rise beyond its borders.

10. Many storms are of great and unknown length from north to south, reaching beyond our observers on the Gulf of Mexico and on the northern lakes, while their east and west diameter is comparatively small. The storms therefore move side-foremost.
11. Most storms commence in the "far West," beyond our most western observers, but some commence in the United States.

12. When a storm commences in the United States the line of minimum pressure does not come from the "far West," but commences with the storm, and travels with it eastward.

13. There is generally a lull of wind at the line of minimum pressure, and sometimes a calm.

14. When this line of minimum pressure passes an observer toward the east, the wind generally soon changes to the west, and the barometer begins to rise.

15. There is generally but little wind near the line of maximum pressure, and on each side of that line the winds are irregular, but tend outward from that line.

16. The fluctuations of the barometer are generally greater in the northern than in the southern parts of the United States.

17. The fluctuations of the barometer are generally greater in the eastern than in the western part of the United States.

18. In the northern parts of the United States the wind generally in great storms sets in from the north of east, and terminates from the north of west.

19. In the southern parts of the United States the wind generally sets in from the south of east, and terminates from the south of west.

20. During the passage of storms the wind generally changes from the eastward to the westward by the south, especially in the southern parts of the United States.

21. The northern part of the storm generally travels more rapidly toward the east than the southern part.

22. During the high barometer on the day preceding the storm it is generally clear and mild in temperature, especially if very cold weather preceded.

23. The temperature generally falls suddenly on the passage of the centre of great storms, so that sometimes, when a storm is in the middle of the United States, the lowest temperature of the month will be in the west on the same day that the highest temperature is in the east.

Some of the storms, it is true, are contained entirely, for a time, within the bounds of my observers, and in that case the minimum barometer does not exhibit itself in a line of great length extending from north to south, but it is confined to a region near the centre of the storm, and travels with that centre eastward.

From these experiments it may safely be inferred, contrary to the general belief of scientific men, that vapor permeates the air from a high to a low dew-point with extreme slowness, if, indeed, it per-
meates it at all; and in meteorology it will hereafter be known that vapor rises into the regions where clouds are formed only by being carried up by ascending currents of air containing it.

EXTRACTS FROM "BAROMETER MANUAL," COMPILED BY ROBERT H. SCOTT FOR THE METEOROLOGICAL OFFICE, LONDON, 1871.

RULES TO EXPLAIN THE INDICATIONS OF THE INSTRUMENT.

It should always be remembered that changes in weather generally give signs of their coming, for the instruments are affected before the wind actually begins to blow or the rain to fall; thus they may be said to enable us to feel the pulse of the atmosphere. It must not be forgotten that the length of time which passes between the first appearance of a change of weather and its actual setting in are not the same. It is much greater when a south-west wind is going to succeed a north-east wind than when the opposite change is about to take place. We shall see, a little further on, why this is the case, and also how the appearance of the sky will aid us in forming an opinion as to probable weather.

The general principles on which the following rules are founded have been laid down by Professor Dové of Berlin on the basis of a long series of observations which were made at several stations situated in the North Temperate Zone, between the parallels 49 degrees and 65 degrees, to which regions they specially refer. The rules themselves may be shortly stated thus:

The average height of the mercury in the barometer, at sea-level in the British Islands, is about 29.9 inches. If the barometer rises steadily above its mean height while the weather gets colder and the air becomes drier, north-westerly, northerly, north-easterly winds, or less wind, less rain or snow, may generally be expected. On the contrary, if the barometer falls while the weather gets warmer and the air becomes damper, wind and rain may be looked for from the south-east, south, or south-west.

The deviations from these general principles which are noticed correspond to the various changes of weather.

If the weather gets warmer while the barometer is high and the wind north-easterly, we may look for a shift of wind to the south. On the other hand, the weather sometimes becomes colder while the wind is south-westerly and the barometer low, and then we may
look for a sudden squall, or perhaps a storm, from the north-west, with a fall of snow if it be winter-time.

No absolute laws for weather can, however, be laid down; the most striking exceptions to the rules are those noticed by Admiral Fitzroy. They happen with north-east winds, which sometimes bring rain, or sleet, or snow, especially during gales, although the barometer may be high and rising. On the other hand, when the wind is north-easterly and light and the barometer begins to fall, rain may set in before the wind changes to east or east-south-east.

Besides these rules for the instruments, there is a rule about the way in which the wind changes which is very important. It is well known to every sailor, and is contained in the following couplet:

"When the wind shifts against the sun,
Trust it not, for back it will run."

The wind usually shifts with the sun—i.e., from left to right* in the northern hemisphere. A change in this direction is called veering.

Thus an east wind shifts to west through south-east, south, and south-west, and a west wind shifts to east through north-west, north, and north-east. If the wind shifts the opposite way—viz., from west to south-west, south, and south-east, the change is called backing, and it seldom occurs unless when the weather is unsettled.

However, slight changes of wind do not follow this rule exactly; for instance, the wind often shifts from south-west to south, and back again.

In most parts of the world it has been observed that there are two prevailing wind-currents, which vary with the circumstances of the place, but are, on the whole, nearly opposite each other.

In these islands these directions are about north-east and south-west, and the latter of these winds blows for about ten times as many days in the year as the other does.

What is it that causes these winds to blow and makes them so different from each other, as we know them to be? The simplest account of them is that the air is always flowing toward the equator from the poles, and back again. It then forms two great currents: one is called the polar current, as it flows from the direction of the pole, and is felt here as a north-east wind; the other is called the equatorial current, as it flows from the direction of the equator, and is felt here as a south-west wind.

The air of the polar current has been chilled, and is heavy, cold, and dry; while it is blowing the barometer is high and the weather usually dry.

* In the southern hemisphere motion with the sun is, of course, from right to left.
The air of the equatorial current has been heated, and is light, warm, and moist; while it is blowing the barometer is low and the weather usually wet.

If we keep the idea of these two great wind-currents clearly in our heads, we shall easily understand most of the signs of the weather which are noticed.

The air of the equatorial current is lighter than that of the polar, and so southerly winds will begin to blow aloft before they are felt on the ground, while northerly winds will begin to blow close to the ground. Accordingly, south-west winds give much more warning of their coming than north-easterly ones.

The south-west wind will often show itself first by long streaks of cirrus clouds at a great height, called "mares' tails," or, when a gale is very near, by driving scud.

Signs of weather, such as those just noticed, are important to any one watching for changes, as they will enable him to confirm or modify the opinions formed from the behavior of his instruments. As to the instruments themselves, we have already seen that when the barometer rises, owing to a change of wind, the weather usually becomes colder; while when the barometer falls, owing to a change of wind, the weather usually becomes warmer. If the barometer be high (above 30.5), and remain steady for some days, it is because there is, so to speak, a surplus of air at the place. The wind will be light, and the weather will probably be dry. A gale can set in only when the air flows away, and it will not at first be severe at the place. If the barometer be low (below 29.0 inches), and remain steady, there is a deficiency of air at the place. The wind will be light also, but the weather will probably be cloudy and wet. However, there may be fine weather for a short time, what is called a "pet day," but there is great danger of a serious storm, because the air will try to force its way into the district where the readings are low, and increase the pressure there so as to restore the atmospheric equilibrium.

If the barometer rises slowly from a low level the weather may become drier and the wind lighter, or perhaps die away. There may also be local fogs.

If the barometer falls gradually from a high level, the weather may become wetter and more unpleasant, and there will never be a certainty of having a fine day, though there need not be much wind.

In general, whenever the level of the mercury continues steady we may expect settled weather, but when it is unsteady we must look for a change, and perhaps a serious gale. A sudden rise of the barometer is very nearly as bad a sign as a sudden fall, because
it shows that atmospheric equilibrium is unsteady. In an ordinary gale the wind often blows hardest when the barometer is just beginning to rise directly after having been very low.

It must never be forgotten that it is impossible for any one to interpret the meaning of all the changes in his barometer at first, or perhaps for a day or two, inasmuch as he requires to learn what is going on at stations in his neighborhood, for without this information he cannot know whether these changes are due to mere local causes, or are the first symptoms of the approach of a more serious disturbance. A storm may be raging at a comparatively short distance from him, but his barometer, taken by himself, will not necessarily enable him to detect its existence.

Professor Buys Ballot of Utrecht and others have shown that we can tell with considerable certainty what wind may be expected to blow at any place if we know the readings of the barometer, taken a short time previously, at a number of stations situated within a distance of, say, one hundred or two hundred miles from that place.

The rule is: Stand with your left hand toward the place where the barometrical reading is lowest, and your right hand toward that where it is highest, and you will have your back to the direction of the wind which will blow during the day.

Thus the wind may be expected to be—

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<th>Wind</th>
<th>When the pressure is highest</th>
<th>North or lowest in the</th>
<th>South</th>
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<td>Southerly</td>
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<td>Northerly</td>
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The force of the wind on each day bears some proportion to the amount of difference in barometrical readings noticed between any two stations situated near the place where the wind was felt. Thus we find that it has been shown that a westerly gale hardly ever blows in the British Isles unless, at least a few hours before, the pressure in the north of Scotland is half an inch less in amount than it is on the south coast of England.

At present it is sufficient for us to say, with reference to the principles above laid down for the behavior of the instrument, that whenever a storm is blowing the level of the barometer will be very different at stations near each other, so that as the storm travels across the country the barometer at any station will show signs of its coming and going by the mercury sinking or rising in the tube. This shows us why it is when the barometer is steady there is no great likelihood of a sudden change of weather, while when it is
changing quickly there is great danger of the wind freshening to a gale.

The direction of advance takes place most usually from some point between south-west and north-west, but not infrequently lies in a different direction, and it is stated that occasionally a motion even from the eastward has been recognized. The velocity of motion varies from five or six miles an hour to as much as sixty or seventy.

Owing to the extreme sensitiveness of the thermometer to changes of weather, it has been frequently proposed to consider its indications as fully equal in importance to those of the barometer; but great caution is necessary in acting on this idea. The accuracy of thermometrical observations depends upon a great many conditions, such as aspect, exposure to the air, elevation above sea-level and above the surface of the ground, all of which are immaterial or can be allowed for in dealing with the barometer.

THE CAUTIONARY SIGNAL.

The Cautionary Signal of the Signal Service, U. S. Army—a red flag with black square in the centre by day and a red light by night—displayed at the office of the observer and other prominent places throughout any city, signifies—

1. That from the information had at the Central Office in Washington, a probability of stormy or dangerous weather has been deduced for the port or place at which the cautionary signal is displayed, or in that vicinity.

2. That the danger appears to be so great as to demand precaution on the part of navigators and others interested—such as an examination of vessels or other structures to be endangered by a storm, the inspection of crews, riggings, etc., and general preparation for rough weather.

3. It calls for frequent examination of local barometers, and other instruments, by ship-captains or others interested, and the study of local signs of the weather, as clouds, etc., etc. By this means those who are expert may often be confirmed as to the need of the precaution to which the Cautionary Signal calls attention, or may determine that the danger is overestimated or past.

This red flag or red light (the Cautionary Signal) is only to be displayed when the information in the possession of the office leads to the belief that dangerous winds are approaching.

The term dangerous winds has ordinarily a somewhat different
meaning according to the location of the station. Thus the severe
gales of the Atlantic (where the hourly velocity of the wind ranges
from 40 to 70 miles) are comparatively very rare on the lakes,
where the limited sea-room causes winds that on the neighboring
shores are registered only as brisk (i.e., 20 to 25 miles) to become
dangerous. Again, the direction in which the wind is blowing is a
most important consideration, and as general experience shows that
most danger is apprehended from wind blowing on to a lee shore,
the Cautionary Signal may very properly be expected to be hoisted
only in case such winds are apprehended for the port in question.

The Cautionary Signal will therefore be hoisted whenever the
winds are expected to be as strong as twenty-five miles an hour,
and to continue so for several hours within a radius of one hundred
miles of the station. It will thus be left to the public individually
to decide whether that wind will be dangerous to any special occu-
pation. It is hoped that eventually it will be practicable to add a
second signal, giving warning of severe gales. Each signal holds
good for the space of about eight hours from the time at which it is
hoisted.

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PLACING AND READING OF THE INSTRUMENTS.

NOTE.—The following instructions apply to Green's, Fortin's, and other barometers
constructed on the Fortin principle, and Robinson's anemometer as constructed by
Green of New York.

BAROMETER.

The barometer must be kept in a room of as uniform tempera-
ture as practicable; and to protect the instrument from such exter-
nal influences as would produce irregularities it should be kept in a
box. The box should be firmly fastened against the wall in a ver-
tical position, in such a way that when open the barometer may
hang in front of a window.

An opening, large enough to admit the tube of the instrument,
should be cut in the upper end of the box, and directly above this
a strong hook of such length as to extend two or three inches be-
yond the box, be driven into the wall.

The instrument is to be suspended on the hook, and when not in
use to be kept in the closed box.

When an observation is to be made the barometer must be slip-
ped out on the hook into the full light of the window.

It is always well to follow a system in every mechanical opera-
tion, and particularly in taking observations, as it ensures an accu-
racy that cannot otherwise be obtained. The following rules are therefore presented:

1st. Tap the instrument a little above the cistern, to destroy the adhesion of the metal to the glass.

2d. Read the attached thermometer, which is very sensitive.

3d. By means of the adjusting-screw bring the surface of the mercury in the cistern in contact with the ivory point which denotes its constant level. If correctly done, neither a line of light can be seen between the point and the surface of the mercury, nor will there appear on the surface of the mercury a dimple caused by capillary action.

4th. Again tap the instrument just above the cistern.

5th. Take hold of the instrument above the thermometer with the left hand, and by means of the vernier screw bring the back and front lines of the vernier into the same horizontal plane with the top of the mercury in the tube, just touching it and no more. Remove the hand, and as soon as the barometer is vertical note whether any line of light appears between the summit and the edge of the ring. When correctly adjusted a small portion is obscured, while the light is seen on both sides.

6th. Read the barometer at leisure, in the following manner:

On the barometer tube is a fixed scale, divided into inches and tenths of inches. There is also a vernier, or sliding-scale, which reads to hundredths of an inch.

First read the point marked on the fixed scale by the bottom of the vernier, which will give the inches and tenths of inches; set this down and then refer to the vernier for the hundredths.

The vernier is divided into ten equal parts, numbered upward from 1 to 10. Commencing at the bottom, examine the lines until one is found exactly coinciding with any line on the fixed scale: the number of such lines on the vernier gives you the hundredths—i.e., if the eighth line on the vernier coincides exactly with any line of the fixed scale, the reading is .08 inches. In case no line of the vernier exactly coincides with a line on the fixed scale, two lines of the vernier must somewhere be embraced in the space indicated by two successive lines on the fixed scale, and observing where this occurs, read for hundredths the vernier line which most nearly coincides with one of them. In case the coinciding line is 10, which only happens when the zero also coincides, there are no hundredths, and zero must be placed for the hundredths.

Whenever practicable compare the barometer with any other good one that may be accessible, by making simultaneous readings of both, and preserve the record of the comparison.
THE THERMOMETER.

Place the thermometer in the open air, so situated that it will be always in the shade, and yet have a free circulation of air around it. The thermometer should be at least from nine to twelve inches from any neighboring object, and should be protected against its own radiation to the sky and earth, and from the heat reflected by neighboring objects.

These conditions can be fulfilled by the construction of an instrument-shelter, which may be constructed outside of a window of a room not heated, and which, corresponding in size to the window, should project about two feet from the panes. Lattice blinds should form the exterior of the shelter; these should always be closed as a shelter to the instruments against all radiation, and should be opened only a little in order to admit light when reading the thermometer.

A foot from the panes, and at the height of the observer's eye, two parallel transverse wooden bars about an inch wide should be fastened. The thermometer should be fastened exactly perpendicularly to the bars, so that its top is secured by a screw to the upper bar, while its bulb projects a few inches below the lower bar, to which the instrument is secured by a clasp or screw.

The bulb should be so placed that it will not rest against a wooden or metal back, but be free from both scale and back.

READING.

In reading it is very important that the observer's eye should be exactly at the same height as the top of the column of mercury, otherwise an erroneous reading will be made.

The reading may be best made through the panes, to avoid the influence of the temperature of the chamber on the thermometer, and a second one should be made shortly after to verify the first. When the bulb becomes moistened by rain or fog, or is covered by ice or snow, it should be carefully wiped, and the reading should not be made until the instrument has acquired the temperature of air.

VERIFICATION.

The zero point should be verified unless the thermometer is known to be correct. To do this, immerse the bulb in a vessel filled with snow or pounded ice, and press slightly a layer of several inches around it, so that the stem, which should be exactly perpendicular, is covered with snow as high as the freezing-point on the scale. Do this in a room the temperature of which is above the freezing-point, as that point indicates the temperature of melting snow.
After about half an hour read it, taking care to have the eye exactly perpendicular to the column of the mercury, and stirring the thermometer about freely in the mixture.

In case the summit of the mercury and the freezing-point of the scale do not agree, note the difference. Some instruments are so constructed as to admit of loosening the screws and sliding the glass tube containing the mercury up or down a distance equivalent to the error, but it is not advisable to make frequent mechanical changes of this kind. The correction should be applied to each reading.

SELF-REGISTERING THERMOMETERS.

The two thermometers—maximum and minimum—are to be placed beside the common thermometer, with their bulbs opposite and free, attached horizontally to two perpendicular wooden bars uniting the parallel bars running across the shelter.

In reading them the same care must be as used with the common thermometer, the eye being in a perpendicular line with the extremity of the index. After verifying the first reading by a second, bring the index of each to the summit of its column by the use of a magnet, in order to set them for the next day’s record.

VERIFICATION.

Compare the two thermometers frequently with the common thermometer, and verify the zero several times each year in the same manner as stated for the common thermometer, and enter the error in the register to be applied at each reading.

HYGROMETER.

These thermometers—one with a dry and one with a wet bulb—must be placed on the same parallel bars as the common thermometer, and several inches apart. The bulbs should be free and at a distance from the bars.

The cloth covering the bulb should be muslin and of fine texture, and must be changed every month, and the bulb cleaned. It can be washed without removing by means of a syringe. It may be kept continually wet, or be moistened a short time before taking the observation; and experience has shown that the average result is the same in both cases. Filtered rain-water must be used.

VERIFICATION.

The two thermometers must be frequently compared, and if they are not adjusted so as to correct any difference which may exist,
the error must be registered and taken into account after making an observation.

**THE ANEMOMETER.**

The anemometer should be carefully fixed in a vertical position, upon a post of sufficient height to bring the dial on a level with the eye of the observer, and in an exposed condition, so as to receive the full force of the wind. The post should be planted firmly enough to prevent the instrument from vibrating.

To obtain the velocity of the wind at any time, two observations, at an interval of exactly five minutes, should be made, and the difference between the readings, which will be obtained in miles and tenths of miles, multiplied by 12, gives the velocity per hour. Example: Suppose the outer index to be at 3 the first reading, and at 3.6 the second, the difference is 0.6, which, multiplied by 12, gives 7.2 miles as the velocity per hour. Great care should be exercised to make these observations exactly five minutes apart.

Reading: Each line on the inner dial indicates 10 miles, and the dial reads by tens from ten to one thousand. Each line on the outer dial indicates a tenth of a mile, and the dial reads, by tenths and by miles, from one-tenth of a mile to ten miles. The zero-line of the outer dial is the point at which the inner dial must be read. Read on the inner dial the line exactly coinciding with the **zero-line of the outer dial**, or if no line exactly coincides, then read the line next less than it.

No line of the inner dial can exactly coincide with the zero of the outer dial unless that zero exactly coincides with the steel index at the top of the dials, except when the instrument is improperly adjusted.

When such coincidence does not take place, the outer dial must be read at the point exactly coinciding with the steel index, and the distance there indicated, which is noted on the outer dial in miles and tenths of miles, must be added to the result obtained from the inner dial.

**RAIN-GAUGE.**

The rain-gauge should be placed with the top of the collector twelve inches above the surface of the ground, and be firmly fixed in a vertical position. It should be examined each morning at the usual time of observation, and its contents carefully measured by a graduated rod, which is furnished with the gauge. Snow should be melted and measured as rain. The gauge should be emptied for each observation. When possible, it is important to keep several rain-gauges in different but adjacent localities, as the results are liable to be much affected by local peculiarities.
AGRICULTURAL STATIONS.

The readers of agricultural literature, as it comes to us from the other side of the water, hear much concerning "agricultural stations" as they exist in France, Germany and elsewhere. The character of these stations, and the nature of the work performed in connection with them, are not clearly understood. The first station established in Germany was in 1851, and it is still in existence, and one of the best managed in the empire. Twelve more were established from 1851 to 1861, and since the latter date 26 have been founded, making 38 in all. In France the first station was founded 1858. It was amalgamated with a school of forestry, and is in connection with a large university. In 1872 the first was founded in Belgium, and in 1872 also the first in Italy. There are now nine stations in the latter country. In Switzerland six have been established, and there they have stations devoted to milk, cheese and other milk products. The chemistry of these, the most important products of the district, is carefully studied. There are two in Sweden, and one has been founded in Holland.

Now, what are the objects of an agricultural station? It is rather difficult to arrange them, because there are stations which have become limited to single objects. A station in a forest district devotes itself especially to the study of forestry. In the south of France and in Italy others are devoted to the treatment and manufacture of products derived from the vine, tobacco, silk, etc. There are some ten to twelve stations which are entirely absorbed in the study of such products and of olives and olive-oil. The objects of an agricultural station may, however, be arranged as follows: (1) objects which are of a definite scientific character—experiments on vegetables, on earth and soil, and on the treatment of the products; (2) the development and feeding of animals, researches upon newly-discovered materials, the analysis of soils, of food and of waste products. One of the most important, because most practical, of the objects which the station has in view is (3) the control of the artificial-manure manufacture. At one of the agricultural stations of Germany in 1867 the amount of manure analyzed for manufacturers in the neighborhood was in value $675,000. That was the value of the manure sold under the guarantee of the station. The manufacturer makes a contract with a station, by which the professors are allowed at any time to come to the warehouses and take any samples they like, to seal them up in the presence of witnesses, and to analyze them, and then, if found correct, they are sold under
the guarantee of the station. The results are published by the authorities, so that the farmer has a public guarantee instead of a private one. The field experiments are not confined to the station alone, but the station is in correspondence with others all over the country, and similar experiments are carried out in many parts of the empire of Germany at the present time.

The fourth object of the station is the teaching department. In many cases the professors take a tour in the district and give lectures and hold conferences, and in this way they spread a knowledge of the facts gathered in the preceding year by the work of the station. The training of agricultural chemists is also practised, and they issue reports and publications which make known the progress made in scientific agriculture.

The fifth object of the station is meteorological observations. The weather, rain, temperature and wind are recorded, and conclusions are arrived at for the guidance of agriculture.

Agricultural stations in a modified form, if established in this country, would do a large amount of good. After twelve years spent in conducting farm experiments in a practical way, we have reached some conclusions regarding the best form of aiding agriculture by schools of instruction. Experiment stations are now being introduced into this country; the States of Connecticut, Massachusetts, New York and New Jersey each have one, and the good work should not stop until there is one in every State.

When the wind is east the turkeys gobble;
It is no time a horse to hobble;
But let him range to catch the breeze,
Should he be troubled with the heaves.

ATMOSPHERIC FERTILITY.

Is there any, and if any, how much, fertile matter is there in the atmosphere, and how made available to vegetation? First, then, we will assert or assume that all the elements necessary to the production of all vegetation is found in the atmosphere. They are, to be sure, exceedingly minute, but still they are there. How often we have seen after a heavy thunder-shower very fine particles of sulphur around the edges of little pools of water by the roadside! and where is the farmer who is willing to say there is no fertile matter in sulphur? Let us, then, at once admit there is fertile matter in the atmosphere, and proceed to the securing it for our use.
To test the matter, we selected a medium dry piece of ground that had been tilled without much manure. No 1 plowed six times in a moist, damp time; No. 2 plowed six times in a dry, windy time; used no manure or fertilizing matter of any kind on either piece except what was in the atmosphere, the object being to test the atmosphere. Planted various kinds of seeds, alike on both pieces; had quite a fair yield on that plowed in damp weather, but little or none on that plowed in dry, windy weather. Since this trial we have endeavored always to plow dry land in moist weather, and vice versa wet land. Hence, if possible, plow dry land in moist weather, and wet land in dry weather; also in working over manure do it on a damp day. And in preparing muck, when you can't afford to use anything with it, fork it over as many times as you can afford to in damp weather, and keep it protected from the weather.

The reasons for working dry land and manures in moist, damp weather are that the atmosphere, being lighter than when dry, allows the saltpetre and ammonia to remain at or near the surface; and as the ammonia is equally distributed in soil and air, what you turn out by plowing is supplied by the abundance you turn under, which lies at the surface. Farmers having light, dry soils to cultivate, and unable to get much manure, if they would aim to plow, hoe and work such land in the weather specified, will find far better crops than if done in dry, windy weather. Farmers will say they can't kill the weeds so well in damp as dry weather. But never mind that: if weeds show a determined disposition to grow, rest assured there is something there that gives them that disposition; and what will cause them to grow is sure to cause what you desire to raise to grow also. The reason for working wet soils in dry, windy weather is, ammonia and iron are in excess and in a comparatively crude state, needing powerful atmospheric action to blend those elements together with soil-element suitable to feed the roots of vegetation.

Muck needs the same treatment as wet soils. In experimenting we have taken a cord of cow manure (being careful to have no urine among it) and a cord of vegetable muck formed from hard and soft wood-timber; worked them over separately five or six times each in moist weather; applied them separately to a piece of land exhausted specially for the experiment; planted various kinds of seeds on each piece. The muck almost invariably gave the best results.

The reason for keeping the urine from the manure is to test the relative value of muck and fibrous manures, unaided by the extra amount of potash and salt found in the urine.
FARMERS' HOMES.

There is no subject more important for a farmer to consider than the one why boys who are brought up on farms are usually so anxious to leave home. It is no doubt true that large cities possess an almost irresistible attraction to very many, but that does not account sufficiently for the giving up the almost certainty of an independent, honorable, affluent and pleasant career for a chimerical prospect of great gain, or to settle down as merchants' clerks, mechanics or hewers of wood and drawers of water in our villages, towns and cities. In these days of daily newspapers, almost perfect mail-communication, the electric telegraph and fast trains the most that is enjoyable in the city is shared by the intelligent and enterprising farmer, while he has not to endure the many disadvantages of city life; and it is in his power to secure to himself almost everything that makes life worth living. And just here is the key to the whole matter. There are a large number of farmers who seem to ignore the bright and beautiful side of life. To them grass was made alone for cattle to eat, not for men to look at and enjoy; to them flowers are weeds, books a snare, rest and comfort idleness and self-indulgence. They give their cattle the very best attention, but let their children take care of themselves and find their own amusements—a task as difficult under the circumstances as that given by the Egyptians to the Israelites, of making bricks without straw. The home is comfortless; there is nothing to interest in the long winter evenings; everything is dull, weary, monotonous, and the younger generation are only too anxious to escape from it; and the only refuge seems to be the city, which swallows them up as greedily as the ocean its wrecks.

The remedy is obvious. Handsome, comfortable houses—not merely a number of furnished rooms, but comfortable, home-like houses—snugly embowered in miniature parks, with neat lawns and flower- and vegetable-gardens; good common-school education for the children, who ought to be taught the principles of growth and successful farming, thus classing it with the sciences; newspapers, music, an occasional visit to the cities to see what they are like and how disagreeable they are,—such things as these will keep the children on the farm. This is no fancy sketch, and is consistent with the best and most profitable farming, for here, as everywhere else, the best wins, after all.

Carrots are by far the best roots for feeding to horses.
GOOD AND BAD.

There runs a fence separating two farms. The same sun shines on both; both are subject to the summer's drought, the frosts of early spring and fall, the tempest in harvest-time, the deluge after seeding; the soil is, or originally was, the same. But one year after another it pays well to farm the one; the other grows poorer, and the owner grows poorer as the years roll on. The reason is not difficult to discover. Ignorance and carelessness are at the bottom of all losses by farming under ordinary circumstances. It is estimated that at least half the losses on farms are preventible. The parching and freezing winds may be broken by a skirting of trees, and the drought prevented by their cultivation. The proper rotation of crops, the judicious cultivation of clover, the intelligent selection of crops for particular places, care in the choice and preparation of seed, careful manuring, exact judgment as to the time to plow, sow and harvest, would almost double the aggregate product of the farms of our country, and leave the land in much better condition than it is to-day. Proper cultivation does not impoverish the soil, but puts back into it in a cheap form that which is extracted in the shape of grain. By it fifty acres are made to produce more than a hundred, at almost half the expense, and through it farmers become rich and independent, the lords of the soil instead of its slaves. This thought is inseparable from the one, What is to be the character of the next generation of farmers? If they are to be successful, they must receive a special education for their work. They will have greater competition than their fathers ever had, and to meet it there should be no common school in which the foundation-truths of agriculture are not taught as well as those of arithmetic.

THE BEST.

There is always a demand for the best in all lines of production. There is no exception in the case of products of the farm. It costs no more to feed well-bred sheep, hogs or cattle than ill-bred ones, but the former will sell at good prices, while the latter are left an expense on the owners' hands or are sacrificed at a loss, to be got rid of. There are certain butter-makers in every market whose products are eagerly sought for, and sold above the market-price before they are offered, because they are known to make the best and offer for sale nothing that is not first-class. Now-a-days, every-
thing is classified according to value. If there is a surplus on the market, the best is taken, the poorest left; if the market is scarce, the best commands any reasonable price, the inferior goods sell for much less. Why, then, do not our farmers aim to produce everything of the best quality? Many of them are actuated by the spirit to make the most of their opportunities, but there are many others who seem to think that what was good enough for their fathers must be good enough for them. So it would be if their neighbors were not improving, and thus raising the general standard of excellence. What was considered good enough fifty years ago will not stand the test now. As long as the highest prices are paid for the best, the more enterprising farmers will spare neither pains nor expense to produce the best; and if their neighbors do not exert themselves to keep up, they soon will find themselves lamentably in the background. Our farmers must keep abreast of the times. They must think; they must read; they must study; they must experiment; they must exert their minds to the fullest extent to drag out from Mother Earth her secrets of fertility. Let them do it, and she will reward them with fertile fields and good crops in abundance, and they will enjoy the richest blessings of the most satisfying and noblest occupation on earth.

BUT ONE CONTINUOUS HARVEST.

The earth brings forth its harvest during the whole year, and while resting in one section it is bringing forth its fruit in another. January sees harvest ended in most districts of Australia, and shipments made of the new crop, whilst in New Zealand, Chili and some other of the South American republics harvest begins. February, March.—Upper Egypt and India begin and continue harvest throughout these months. April enlarges the number with harvest in Syria, Cyprus, coast of Egypt, Mexico, Cuba, Persia and Asia Minor. May is a busy time in Central Asia, Persia, Asia Minor, Algeria, Syria, Morocco, Texas, Florida, China and Japan. June calls forth the harvestmen in California, Oregon, the Middle and Southern United States, Spain, Portugal, Italy, Hungary, Roumelia, Turkey, South Russia, Danubian states, south of France, Greece, Sicily, and in Kentucky, Kansas, Colorado, etc. July usually sees harvest begin in the southern, eastern and midland English counties; in Oregon, Nebraska, Minnesota, Iowa, Illinois, Indiana, Michigan, Ohio, New England, New York, Virginia
and Upper Canada; in France, Germany, Austria, Italy, Switzerland, Hungary and Poland.

August continues the gathering in the United Kingdom, France, Germany, Belgium, Holland, Manitoba, Lower Canada, Denmark and Poland.

September rules Scotland, parts of England, America, Sweden, North Russia; and in France buckwheat is harvested.

October sees wheat, oats, etc. gathered in Scotland, and corn in America.

November.—Harvest-time begins in South Africa, Peru and North Australia; and in

December the Argentine Republic, Chili and South Australia begin to reap their harvest.

'Tis always harvest somewhere in the world;
Th' unwearied sun ne'er pauses in his work:
His rising and his setting's but the blush
That mantles on the cheek of passing earth
In the bright levee-presence of her king.
The husbandman who seeds his English land
In dark November sows it whilst strong wheat
Grows ripe in Greater Britain's austral plains,
Where Christmas-tide's the time for harvest-homes.
All days are golden, and the whole year but strings
On which the master-harper of the world,
The Sun, is ever making harvest-songs.

—From London "Graphic."

DIVISION OF THE CROP.

One part cast forth for rent due out of hand;
One part for seed to sow thy land;
Another part leave parson for his tithe;
Another part for harvest, sickle and sithe;
One part for ploughwrite, cartwrite, knacker and smith;
One part to uphold thy teams and draw therewith;
Another part for servant and workman's wages laie;
One part likewise for filbelle daie by daie;
One part thy wife for needful things doth crave;
Thysel and thy child the last part would have.

—From Tuss'rs "Five Hundred Points of Husbandry," published 1562.
EXCELLENT POINTS OF AN ANIMAL.

An ox with broad horns and short glossy hair
Is good for a team, the market or fair.
One white foot is bad, and two are too many;
The horse is best that does not have any.

THE COW.

On the Best Breeds—How to Choose a Good Cow—How to Keep Her in Permanent Profit.

BY WILLIS P. HAZARD.

To properly consider and answer the question, What are the best breeds of cows for butter and milk dairies? the farmer will not simply declare his preference for the Holstein, the Hereford, the Devon, the Shorthorn or Durham, the Guernsey, the Ayrshire, or, though last and least, still not the least important, the Jersey breed, nor even for the native with its imperfectly traced and mingled ancestry, but will carefully study the merits of each, or at least such as may be within his reach, for the three leading points of yield, profit and food; or, in other words, the early period at which they are ripe for the butcher, the great amount of food they produce in return for the food they consume, and the large proportion of prime meat which they yield. A proper consideration of these three points will naturally tend to the study of "How to select a good cow," and, having obtained such a one, "How to maintain her in the best condition for profit."

THE DUTCH, FRIESIAN OR HOLSTEINS.

The enthusiastic admirers of the Holstein or Dutch breed—and their numbers are rapidly being increased—as well as the best authorities upon the subject, all agree that the best strains of milking-qualities are derived from the Holstein breed. That the Danes imported into England stock from Denmark, Jutland and Holstein is matter of history. They settled in the county of Durham; from thence their cattle spread eventually all over England—became known as Shorthorns, and as such have been imported into America, where by great care they have been so much improved as to be exported again to England at fabulous prices, and have there taken some of the most important prizes. But while the attention of the English cattle-breeders has been given to improving and perfecting the beef-producing qualities of their Shorthorns, the Dutch dairy-farmers have been improving their dairy stock until they have at-
tained to a degree of excellence unsurpassed by any other breed. The reasons for these two lines of management are easily seen: in England the price of meat has so enormously increased of late years as to pay farmers better to raise meat and import their butter and cheese; while in Holland their attention is devoted especially to the dairy and the manufacture of butter and cheese, and therefore they are especially particular in the breeding, keeping and care of milch cows.

When selecting a cow to breed from, they choose one of a considerable size, not less than four and a half or five feet girth, with a length of body corresponding; legs proportionately short; a finely-formed head, with a forehead or face somewhat concave; clear, large, mild and sparkling eyes, yet with no expression of wildness; tolerably large and stout ears, standing out from the head; fine, well-curved horns; a rather short than long, thick, broad neck, well set against the chest and withers; the front part of the chest and the shoulders must be broad and fleshy; the low-hanging dewlap must be soft to the touch; the back and loins must be properly projected, somewhat broad; the bones not too deep, but well covered with flesh; the animal should have long, curved ribs, which form a large breast-bone; the body must be round and deep, but not sunken into a hanging belly; the rump must not be uneven; the hip-bones should not stand out too broad and spreading, but all the parts be level and well filled up; a fine tail, set moderately high up, and tolerably long, but slender, with a thick, bushy tuft of hair at the end, hanging down below the hocks; the legs must be short and low, but strong in the bony structure; the knees broad, with flexible joints; the muscles and sinews must be firm and sound; the hoofs broad and flat, and the position of the legs natural, not too close and crowded; the hide, covered with fine glossy hair, must be soft and mellow to the touch, and set loose upon the body; a large, rather long, white and loose udder, extending well back, with four long teats; large and prominent milk-veins must extend from the navel back to the udder. The color of the North Dutch cattle is black and white beautifully contrasted.

The Holsteins are now recognized as a very superior kind of large Shorthorn cattle, remarkably good for milk, both in quantity and quality. As working-oxen they have a very high reputation, being large, strong, well-made, quick, high-spirited, have great endurance of heat, are very muscular, and, having great aptitude to fatten, drovers and butchers esteem them highly. They are extremely valuable to cross with other breeds.

Four cows, each five years old, measured six feet four inches in
girth, seven feet six inches in length, four feet six inches in height, and weighed twelve hundred and fifty pounds, none varying much from these dimensions. One of the four produced at four years old, in the month of June, an average of fifty-six pounds of milk per day for thirty days, and one year later, in seven days, seventy-three pounds per day. The milk, too, is of the most fattening and nutritive quality, as is evidenced by a calf born in August weighing at birth one hundred and ten pounds, increasing in eighty days to three hundred and fifty pounds, or an average gain of three pounds per day.

As the Holsteins are peculiarly adapted to our section of country, are excellent for cheese-making or production of milk for the family and market, and for butter, we hope to see the breed more extended, believing they are pre-eminently adapted to the wants of the general farmer, combining the three desirable qualities of dairy, beef and work-cattle. One objection has been made to them—that if proper attention is not paid to their breeding they are apt to degenerate into large, coarse stock.

THE SHORTHORNS.

The Shorthorns would naturally next claim our attention, deriving so much as they did from the Dutch breed, and also on account of the importance to which they have attained in the United States. In 1815 and 1816 a few Shorthorns were imported into this country, and for the next four years more were imported into Kentucky, were carefully bred, and from thence spread through the Western country. In 1834 an association in Ohio brought over nineteen head, and in the following year two additional lots, and since then several hundred with well-established pedigrees have been imported into the United States. From the fact that the first prominent breeders of the Shorthorns resided in Durham county, they took the name of Durhams, and have so retained it with many of our farmers ever since.

During the fifty years the Shorthorns have been domesticated in this country they have been imported in greater numbers than any other breed, they are more widely known, and have acquired greater popularity; surely this must have been from some good qualities which have so strongly tended to recommend them. They have become acclimated, and are healthy, thriving on common food equally well with our native cattle. They are of large size, fine, tender meat, grow rapidly, and take on meat and fat fast in proportion to the amount of food they consume; make powerful and docile oxen, are excellent in the dairy, giving large quantities of milk and
butter and rich cheese. With all these qualities we might readily suppose pure Shorthorns were just the breed for farmers. Our own choice is the Durham, the Jersey, and the Durham and Jersey mixed. Wherever there is good pasturage and plenty of winter fodder the Durhams will thrive well, but they are not the breed for stony land with scant herbage, where they have their living to earn; the Devon or the Kerry cow is the one for that.

With many of our farmers the Shorthorns have the reputation of being better beef-producers than milk-raisers; but where proper attention is paid to having the bull of stock showing a strong milking tendency, and the cow the same, excellent stock can be raised for quantity and quality of milk. They are naturally good milkers, and where raised for that object no milch cows exceed them. It has been from the undue attention to their beef-producing qualities that many have been led to suppose they were not as good milkers as some other breeds; we have always found their milk to be very rich.

We will now give the points by which to select a pure-bred Short-horn bull, merely repeating that for milk-cow breeding a bull descended from milk cows must be selected. The bull's head should be fine, yet masculine; the muzzle small; the nostril wide and open; the nose cream-color, orange or drab, even a nut-brown, but never smoky or black; the face and jaws lean of flesh; the forehead broad, the face slightly dishing or concave; the eyes prominent, bright and mild; the ears small and lively in action; the horn well set, flattish in shape, and waxy, not white, in color, with no black, except at the very tips, inclining outward, and not much upward. The neck should be somewhat arching, as showing masculine strength and power, and setting well back on the shoulders, with a clean throat and no dewlap, except a slight pendulous thread of skin at the brisket.

The shoulders should be set wide, straight and open at the top, smooth at the points, with a bull-neck vein, ending below with a full, thick brisket, projecting forward. The knees should stand wide, and below them a firm, compact leg, ending in a clean, well-shaped hoof. The chine and back should be on a level from the shoulders to the tail; the ribs round, springing roundly in an arch from the back, and running down to give full room for the heart and lungs to play in a broad, deep chest. The hips should be wide and on a level with the back; the flank full and low; the loin full, long, level and broad; the rump level and well-shaped; the tail set symmetrically and level, small and round in shape; the thighs broad; the gambrel-joints straight, and the leg below fine and
sinewy. Fineness of bone and a soft, elastic touch, or "good handling," are also two indispensable points. The temper should be mild and gentle.

The same points apply to the cow, though modified by the gentler and more refined qualities of her sex. If the milking-qualities are no object to the breeder, he will select only for symmetry, good constitution and general excellence. If milk be the object, the parts indicating that quality are to be considered, and selections made accordingly.

As to the color, tastes differ. Red, red and white and the red roans are mostly preferred, but any color from red to clear white is a good Shorthorn color. White is usually least preferred, simply as a matter of taste, and therefore as a color for thorough-breds is not so saleable; but for beef-breeding the color is of little consequence, so that the animal itself is good. Specimens of this breed have brought the highest prices ever given for cattle.

THE DEVONS.

The Devons may fairly next claim our attention, as perhaps, next to the Shorthorns, more of this breed have been imported into this country than of any other. Of this breed whilst on a visit to Devonshire we noticed two kinds, the North and the South Devons, evidently originally from the same stock, but by a long course of breeding in special localities of quite different appearance—the North Devons of smaller size and a deep rich red color, the South Devons more of a tawny red, rather larger and more chunky; the cows of the former weighing about one thousand pounds, and those of the latter about twelve hundred pounds. The South Devons are very beautiful, of small bone, but of very fleshy appearance, as they rapidly take on flesh at two and a half years old.

The Devons, while giving moderate quantities of milk, give that of very rich quality; therefore for those who have milk dairies we should not recommend them, but a few to help the butter-yield and improve the color is desirable. As oxen they have no superiors, being of moderate size, weighing about fifteen hundred pounds, though often fattened to two thousand pounds; active of foot, though their short limbs would hardly indicate it; easily fattened, as they "take on" very quickly, affording the choicest meat for the butcher; and withal they are docile, amiable and easily taught; they will thrive where larger or more delicate animals would hardly live, being hardy and vigorous.

THE AYRSHIRES.

Among the milk-breeds prominent in the British Isles the Ayr-
Ayrshires hold a leading place. They derive the name from the county of Ayr in Scotland, where they are principally kept. Their superior qualities as milkers and for hardiness of constitution have induced various writers to attribute part of their origin to their favorite breeds. Nearly equal testimony is offered in favor of the Holsteins, the Shorthorn and the Jersey, though the weight of the testimony is in favor of the Jersey. They have always borne the character of being prolific milkers, with butyraseous quality particularly in proportion to their size, which is small. The Ayrshire farmers, finding more profit in their dairies, have paid great attention to improving this breed, so well suited to them; and perhaps no breed affords a better illustration of what care and design will do to develop peculiar properties in an animal at the expense of other qualities. The result is dairy animals of high quality, and they have been introduced largely into England, the north of Ireland and this country.

Instances are cited of large yields, but we believe the usual average to be six hundred gallons per year, or one hundred and seventy-five pounds of butter, or four hundred and thirty pounds of cheese, where they are well fed and cared for. The oxen work kindly, and steers can be turned off at three years old weighing seven or eight hundred pounds. The beef is excellent, the fat being much mixed with the flesh, though not a favorite with the butcher, as he cannot sell so much tallow as from other breeds.

The following are the principal points: The head must be small, high and bony; the eye bright; the horn white, with a dark tip, widely set on, inclining upward, and curving slightly inward; neck very thin and light, as the whole fore end must be; shoulder thin at the top; the posterior ribs must spring well from the backbone; the loin must be broad and form well with the wide hips and the capacious pelvis; the whole frame thus forms a true wedge, with the point at the shoulder. The rumps are wide and tolerably high, the tail long and slender, the legs straight, the thigh rather thin, and the udder must be large and broad, extending well forward, with thin, flexible skin, and teats wide apart, hanging perpendicularly, and from two to two and a half inches long. The colors must be red and white, splashed and blotched, and becoming roan, as in the Shorthorn, but with cloudy-defined edges; the white portion is often flecked with the darker color. Black and white, brown and white, are not uncommon now; the darker the red, even becoming deep brown, the more fashionable.

Popular as this breed has become in New England, we believe it will never become very much so in rich sections. Rich pastures will support larger breeds, which when turned off and fattened will
bring in more money. As a breed to cross with larger stock, or even with the Jersey to increase the richness of its great flow of milk, we would recommend it highly.

THE JERSEYS.

The Jerseys—formerly called Alderneys, from the fact that they were imported into England from the Channel Isles, of which Jersey and Alderney are well known—have of late years so occupied public attention that we must devote some space to their well-defined merits.

The Jerseys are noted for their extraordinary richness of milk and their beautiful form, thus making them the most desirable breed for small country places, for crossing with other breeds to improve the strain of milking qualities, and for giving character to the butter of the dairyman.

Brought up in a mild climate which hardly knows any winter, they have been imported into this country, and stand the change and the rigors of our winter nearly if not quite as well as our natives, and in fact improve so much that many good breeders claim that we have fine cows born here of the Jersey breed that are superior to the majority of those in the Channel Islands.

In their native country great care is taken of them; they are housed from the wet, are carefully fed, and form almost as much one of the family as the pig in Ireland. When pasturing, as the farms are very small, they are tethered by a rope attached to their horns, allowing them a circle of sixteen feet diameter, and changed to new spots three times a day. With the constant contact they have with the farmers, or mostly their wives, who have the principal care of them, the cows become very docile and affectionate. In this country, where the same care is not taken of them, they sometimes become wild, and even very cross.

The peculiar colors and beautiful shape of the Jerseys at once excite attention, and enable them to be recognized at a glance, their deer-like heads and large prominent eyes being very noticeable. Their chief characteristics are: in the cow the head is small, thin and rather long; her horn is short, delicate and curved forward, white with a dark tip; her muzzle is black, and encircled with a band of light color, as is the eye, which is bright, large and prominent; her ear is small and flexible, the inside skin being bright yellow; her neck is thin and delicate, and of medium length; her shoulders thin and sloping, and forming with the fore ribs a gradual slope outward to the hips; the back tolerably straight from withers to setting on of tail, though generally with some sway from the size
and weight of the stomach, which is large; her loin is wide and the hind quarters well spread, and pelvis roomy; her tail is long and delicate, with a full brush at the end; the thighs are thin; chest deep, though narrow; legs very fine below the knee; hocks slightly turned inward; udder large, reaching well forward, with teats of moderate size placed wide apart; skin thin, and not too loose; hair smooth and fine. The color varies: yellow, yellow and white, mouse-color or dun, brown, and almost black, are the chief tints. The bulls are usually darker than the females, and the depth of color increases with age. The head of the calf is strikingly like that of a fawn, and at all ages the peculiar coloring, large dark eye and flexible ear give the head a deer-like look.

The milk of the Jersey cow is particularly rich, and is of a deep yellow color, yielding a butter of a rich golden color and of peculiarly firm grain and fine flavor. The amount of cream is proved to be from 19 to 25 per cent. While the quantity given is not large, but in proportion to her small size good, its peculiar richness and color make it of great importance in giving character to the milk of a dairy. Twelve quarts per day is perhaps a fair average, though it is proved by analysis to be far richer in butyricaceous qualities than that of any other breed.

The Jersey is not a large consumer, even in proportion to her size, and when dry thrives fast and makes excellent beef; the calves are, however, not a favorite with the butcher. As a breed to cross with the native the Jersey has no superior, refining those of a coarse tendency, and giving her peculiarly rich color of milk, cream and butter. The principal drawback in their breeding qualities is that they are not sure getters.

As a dairy cow for the farmer the Jersey will never be very popular, the first cost being too great for profit compared with other stock; for a milk dairy the yield is not large enough; for a butter dairy, while the yield is very great and of the best quality of butter, it will not pay the general farmer, but only those who attend market personally and have particular customers who will pay fancy prices. But we would strongly advise every farmer to keep at least one Jersey to every ten, if not to every six, cows, of whatever breed. And we think no better cows can be raised than by the use of a Jersey bull with cows of native or other stock which have proved themselves prolific milkers. And here we should like to say a few words against the practice now so common amongst us of raising few cows, and buying our supplies for the dairy from herds that we can know but little of. One good cow that proves herself valuable as a milk or butter cow should have her progeny
well got and carefully reared. Any farmer can better afford to raise such than to purchase from chance opportunities; and the cost of two or three good calves raised upon a farm each year will never be felt, and in a short time they will come into profit. It stands to reason that the stock that is raised by a farmer at a distance and sent here to be sold cannot be the raiser’s best, those he is sure to keep, and it can hardly pay us to buy the poorest to milk a few years and turn over to the butcher.

In improving our stock we must breed intelligently, bearing in mind that the cow needed for the dairy cannot, under any circumstances, be selected for those qualities which will produce fat—the two natures are incompatible: to have the best meat we must get rid of every tendency to milk, and to have the best butter we must obviate every disposition to fat. We cannot have both qualities in the same animal, and the attempt will end only in disappointment. And this is one of the proofs of the great value of the Jersey for the dairy: the unusual secretion of the fat in the milk may reasonably be attributed to the slight waste of the fat-forming portions of the food that moderate respiration and limited exercise make possible, and to the fact that the fat in this form, rather than in flesh, has long been the prime object of the farmer’s attention.

THE GUERNSEYS.

The Guernsey breed is one that is now rapidly coming into favor as the farmer’s cow. It has all the merits of the Jersey for rich milk and high-class butter, and, although it has not the beauty of the Jersey, still it is a larger animal and gives a much larger quantity of milk. To those who are acquainted with her excellent qualities the Guernsey cow has a beauty that is highly valued. The quietness and docility of both cows and bulls is very strong recommendation of them as one of the best points of a milking stock.

As large as a small Durham, they are usually of a lemon-fawn or a reddish-yellow color, largely blotched with white. The white, besides being on the sides, across the back and shoulders, and often on the neck, on the belly and at the tip of the tail, is almost always on all four legs, more or less. Around the eye should be circles of buff or yellow; on the muzzle buff, though black is now being admitted on account of its frequency. The head is long; the eye mild and placid in its expression; the horns waxy, thin and crumpled; the skin usually of a rich golden color; the hair, even when a little long, soft and fine. Altogether, the animal speaks for itself as a rich butyraseous milk-giver, and in large quantities. No finer butter is made than the firm, waxy-grained,
self-colored butter of the Guernsey. The cream is of the most golden hue.

The Guernsey when crossed upon other breeds makes its mark strongly, enriching the qualities of the breed crossed; and where this has occurred we have seen the traces of the Guernsey inter-mixture many years after the original stock was gone. At the present time, owing to their scarcity, the Guernseys bring the highest prices, but when they shall become more plentiful they will continue to grow rapidly in favor and become the popular cow for the farmer.

We have devoted so much time to the value of a few of the leading and most popular breeds that we shall have to hurriedly allude to the Herefords, the Galloways, the Kerry cow or the Swiss cattle.

THE HEREFORDS.

The Herefords, supposed to have sprung from the same stock as the Devons, have the same rich color, but always with a white face, and should be white on the throat and the under portion of the body. In size the Hereford ranks next to the Shorthorn, attaining very nearly as great weight at not quite so early an age; but the graziers prefer Shorthorn heifers and Hereford steers; they make excellent oxen and steers, but the cows are not prime milkers: this reason makes them popular in England, where beef is the principal object, but they will probably never attain so much popularity here, though when better known they will be more sought for in the West, particularly as they are lower-priced than the Shorthorns.

THE GALLOWAYS.

The Galloways, more introduced into Canada than into our country, are natives of the Lowlands of Scotland; they are usually black, and without horns, and as they are best fitted for colder and rougher sections than here, are not likely ever to be much introduced, as, though their milk is rich, it is deficient in quantity. They fatten on scanty fare, have a hardy constitution, yield a superior quality of beef, but are slow in coming to maturity.

THE KERRYS.

The Kerry cows we saw in perfection in the vicinity of the Lakes of Killarney, and tasted their rich milk. They have been imported in small numbers, particularly into Massachusetts. As we saw them, they were mostly black, some brown or brindled; they are small and very hardy, but neat and trim-looking; almost wild, living in the roughest country on the slimmest sort of pasture,
SWISS CATTLE—WHAT OUR FARMERS WANT.

which they crop with the goat. They are emphatically the poor man's cows, yielding for their size abundance of milk of a good quality, and fattening rapidly when required. That the poor man appreciates them is proved by the price asked for them, about fourteen pounds; and we saw poor fellows who tasted meat but once a year who lived on the buttermilk of their product, with potatoes and our corn meal, who did not care to sell them for that, the butter being nearly the only article that brought them in any money, save their labor, as the pig went to pay the rent. Good yielders as they are, we think their size and price will prevent them from making much progress in this country.

SWISS CATTLE.

The Swiss cattle have not been largely imported into this country, but they bear a high reputation at home and in France. They are hardy and robust, usually of a dun color, or dun and white, with medium heads, hanging dewlaps, rather coarse shoulders, and broad hips and quarters, with well-developed udders, reminding the observer very much of the Jerseys, though of a coarser build. They bear removal to other climates readily, fatten well and are excellent milkers. The best cows yield an average of from ten to twenty quarts daily, and about two hundred and twenty-five pounds of cheese in a season of four months. We should be glad to see them imported, feeling sure they would much improve with richer pasture and be a valuable acquisition.

WHAT OUR FARMERS WANT.

We have thus given a short sketch of the most prominent breeds, and as each has some distinctive merit, it is nearly impossible, in deciding which breed will be of the most profit, to satisfy all tastes and judgments; but as each farmer is apt to have his own favorites or dislikes, as his own experience has caused him to think, perhaps the truest way to arrive at a correct conclusion will be to ascertain what the general farmer needs.

First. He wants a good-sized animal, which will bring most of its cost when fed off for beef after failing as a milker.

Second. He wants a cow that will come into profit early.

Third. He wants a cow that will give plenty of milk, and rich, whether for milk, butter or cheese.

Fourth. He wants a cow that will consume the least food for the product gained.

Fifth. If raised for oxen, he wants those that will be tractable, active and docile, and will feed up quickly for the butcher after service.
Is there any one breed that will combine all these qualities? We believe the Durhams will come the nearest to it, or the Durhams and Jerseys mixed. And we repeat what we have said before, that the farmers should raise their own stock more, by selecting the best cows they have or can get, whether native or imported—the latter we presume not often, as being too high-priced—and breeding them with the best bull of pure stock of known milking-qualities they can get. And by paying attention to the business of improving their herds, and by judicious crossing, they will soon reap the profit and satisfaction they deserve. So much good stock has of late years been imported that it is better and cheaper to get cattle that have been Americanized than to risk the cost and danger of importation. There is, however, a class of farmers, whether amateur or practical, whose duty it is to introduce new and valuable stock as they can afford it; but it is also the duty of another class, who can't afford it, to encourage such undertakings by paying a little larger price than usual for the services of an imported bull, and not, by sneering or depreciating the value of all such animals, to make the importer feel he has undertaken a thankless task, and an unremunerative one, for the extra price even will not pay him.

**HOW TO CHOOSE A GOOD COW.**

Having decided what breed to raise, the first important step is to know how to choose a good cow. There are a few general rules. See that the cow is as much wedge-shaped as may be; that is, viewing her from the side, that she increases in height and depth the farther you go from the head; and from the front, that from a small head and narrow neck and shoulders she gradually and regularly enlarges to a broad hip and back. 2d. See that her "mirror" or "escutcheon" is good and free from depreciating marks. 3d. See that her milk-veins are large and prominent, and where it enters the stomach that the hole—or better if two—is large and deep; that the udder is full in the forward part, and that the teats are of good size, well separated, and not too projecting toward the sides. 4th. The hair and hide must be soft, mellow and rich.

A general examination should show the head small, slender and lengthy from the eye to the nose; the horns thin and open, not crumpled nor too curly; the eye full, but not too prominent, the latter quality indicating an excitability, and consequent restlessness of disposition, that is not favorable to the production of milk; the ear lengthy and broad, and well fringed with hair, which protects it from the annoyance of flies and indicates a strong constitution; a broad muzzle should be avoided, as showing a tendency to fat; the
neck should be long, flat and narrow, with a tendency to rise at the withers, and breadth behind the arm to allow of a full expansion of the lungs, the chest being rather deep than broad; the flat-sided cow is more especially to be chosen if she has depth to the barrel, with the ribs bending fairly outward, somewhat the shape of a horse-collar; the hips should be wide, rugged and high, and the pelvis or haunches wide and large, drooping toward the tail; the thigh long and lean from hip to hock, the veins being prominent and easily felt; the legs slender, with flat bone; and small flat feet, the hinder ones having a good width between, to afford room for the udder. A long and thin tail is a great point in breeding.

The udder, the reservoir of the milk, to which all former points are secondary, should be free from hair, flexible and soft, with no tendency to flesh; the bag extending well forward, as level as possible with the belly, and high up between the thighs. The feeding-veins should be particularly observed. In the heifer with her first calf they must be felt for with the hand; in this case two holes will be discovered by feeling under the belly nearly in a line with the navel on each side in good milking heifers—about the size of a dime. As age increases the holes extend, and the veins become large and easily perceived by the eye; the larger these feeding-veins appear, the greater is the quantity of milk. The teats should be well separated, not fat or fleshy, and not too long, but sufficiently tight to retain the milk, having a tendency downward—that is, to use the technical term, not strutting, or pointing away from the quarters, as this causes waste of milk and difficulty in milking. The hide also will be found useful in determining the fitness of particular cows for particular localities, but has little to do with the milking properties. If possible, it is better to accustom a cow to cold and exposure by degrees, in which case the hide will adapt itself to the altered condition by thickening and producing more hair.

A good cow not only yields much good milk, but almost in proportion to the quantity given daily is there a long continuance of the secretion between the periods of calving. But no cow should be allowed to give milk beyond eight months before calving; the system requires at least one month's rest; the calf will be larger and healthier, and the mother will yield better and richer milk after calving.

The fact that the system is more capable of undergoing natural, though very marked, changes in early life without danger renders a young animal indispensable for the dairy, either to breed from or to prove profitable to the keeper. To determine the age of a cow is therefore a matter of importance, and this can be done with great precision by examining the teeth and horns.
To determine the milking-qualities of a cow many important points have to be considered. In addition to those we have mentioned, the skin should be free, thin, and may be covered with hair of any color, according to the breed. The tail is by some much looked to, and it is believed that when fine and reaching down to the hocks, with a fine tuft of hair, it is associated with other good milking-points. If in addition to large milk-veins the network of veins seen beneath the skin over the fore quarters of the udder, and the udder itself, and those which pass upward behind toward the tail—in fact over the perineum—are large, they are sure tests of a competent milker. They should be highly developed, large and varicose; they are irregular, in zigzag lines, knotted, and more or less oblique. To estimate them it is necessary to take into account the state of the cows in respect to flesh, the thickness of the skin, food, general activity, fatigue, journeys, heat. It is necessary also to recollect that in both sexes all the veins are larger in the old than in the young—that the veins which encircle the udder are those which, if the cows are in milk, vary most according to the different periods of life; though scarcely apparent in youth, they are of considerable size when, after several calvings, the operation of calving has given the gland its full development. Finally, there is the most valuable of all methods—Guenon’s system.

Guenon’s Method.

Guenon, rising from the humbler classes, and from his boyhood being among milk cows in the vicinity of Bordeaux, narrowly observed the relation between the amount of milk secreted and the development of the patch of skin covered with upturned hair extending from the udder upward and laterally over the thighs. He could tell almost infallibly about the exact quantity any cow would give, and the quality. And so may the thorough student of his system, as it is based upon facts and long observation. It is not very easy to give intelligibly the whole system, in order to adopt it without further guide, in a condensed article like this; a practical demonstration will prove more instructive. But the farmer should not fail to become thoroughly acquainted with it, as simplified and made easy and plain in the book with one hundred engravings published by J. M. Stoddart & Co., Philadelphia, entitled How to Select Cows, by Willis P. Hazard; they send it by mail on receipt of fifty cents.

Ten forms of scutcheons or mirrors have been described, and constitute the basis of Guenon’s classification. The surface of the scutcheon is distinguished by the hair turned upward and opposite
in direction to that covering other parts of the animal's skin. This hair differs from all the rest in color, and is fine, soft and close. The scutcheon springs from the middle of the four teats, whence a portion of its hair springs and extends toward the navel; whereas the other part rises toward the inner and upper part of the hocks to the middle of the posterior surface of the thighs, then, rising over the udder on the perineum, it extends in some classes to the upper angle of the vulva.

The surface or extent of the scutcheon denotes the milking capacity; its form and outline indicate the class; the fineness of the hair and the color of the epidermis the quality of the milk. For the most part, it is very easy to distinguish the scutcheons by the upward direction of the hair which forms them. They are even sometimes surrounded by a line of bristly hair, turned backward, and formed by the meeting of the upward and downward hair. In some cases animals thus marked are to be avoided as being bastards.

It is just as important that the bull should have as good a scutch-eon as the cow, as the qualities of the mother inherited by her son will be transmitted to her daughters; and for this reason also is it very necessary that the bull shall have a good parentage.

HOW TO MAINTAIN THE COW IN PROFIT.

With a good selection made there will necessarily follow the question, How to maintain her in good condition for profit? It must be apparent to every thinking person that good qualities, even in the highest perfection, will not ensure an abundant and rich supply of milk unless proper care is taken to furnish the cow with the kind of food best calculated for the required purpose.

THE ART OF FEEDING.

The first requisite is, that the animal should have abundance of food, so as to be able to consume all that she requires in as short time as possible, as then she will lie down and have the more time to secrete her milk, and that milk acquire richness. In short, she must not have to work too hard for her living. The pasture should be often changed, and if not in pasture the food should be succulent, otherwise fat instead of milk will be produced; but cows fed with food of too watery a nature, which is the case with roots early in the season, require an addition of more solid food, such as meal or good clover chaff, otherwise the milk, although considerable in quantity, will be poor and wheyey, yielding no cream. Such roots should be carefully selected as have no symptoms of decay, and should be mild in flavor, or the butter will be tainted. In very cold weather, and as a change of food, use oil-cake and ground oats,
steamed or boiled. The best roots are carrots, yellow turnips and mangold-wurzel, succeeding each other.

The cow and the horse can well pasture together, but no other animal should be allowed in the same field, pigs and poultry spoiling and tainting the feed. The pasture must be kept clean from weeds and all refuse matter. It must be supplied with an abundance of pure water and be free from all standing water. Cows should be taken in about sunset, or before they are preparing to rest for the night, and should not be hurried to or from pasture, especially when full of milk. Experiments have proved it is better cows should not remain out all night, after August at least, but be stabled in an open, airy shed.

Cows should always in winter be well fed, regularly fed, and with sufficient food of the right kind. Regular currying is of the greatest utility, as it keeps the pores open and promotes the circulation. Feed twice a day as much as they will eat of timothy and clover hay mixed, with two quarts of Indian meal unbolted, four quarts of wheat bran, and half a peck or a peck of carrots or sugar-beets, to each. Turnips may be fed to dry cows, but for milking cows they give a taste to the milk and butter. Corn-fodder is excellent as an addition, but if fed by itself will give an unpleasant taste to both milk and butter. Steamed or cooked food is now much used, and to great advantage, but we doubt if it pays where but few are kept; cows will eagerly drink the hay-tea that is left after steaming the hay. Potatoes, raw or cooked, are excellent food, and thus the small ones come into play. In summer-time or early fall, if the pasture is short, fresh corn-fodder helps the milking-qualities wonderfully, and we are glad to see it is much more raised than formerly. The earlier it is grown and the earlier it is fed, the more it will help the milking-qualities. A piece of rock-salt should always be where the cows can find it.

THE MANAGEMENT OF THE COW.

The proper management of milking cows is no less important than proper food.

It should always be borne in mind that the animal whose capabilities are for milking becomes lean on the same quantity of food as will make the feeding cattle fat. The consequence of this is that the milking (and therefore lean) cow is more affected by changes of temperature than the feeding or fat one. Therefore, for successfully maintaining her in profit care should be taken to avoid rapid and considerable changes of temperature, as well as damp or clay land. There should always be a clean, dry shed in which the cattle
may take shelter whenever they feel uncomfortable either from heat and flies or cold and damp. This shed should be well drained and opening to a warm aspect.

An animal always cold is always uncomfortable, and a large proportion of the food she takes is consumed in keeping up the heat of the body instead of making milk; warmth is therefore food to the cow, and may be obtained with little cost and less trouble than some other food. Cold and sudden chills are a great detriment to the appearance of the cow, and are frequently the cause of her falling off in her milk so early in the season. So it is in turning cows out too early in the season; much injury is done by exchanging them from a warm yard or shed to pass the night in the open air before the season is sufficiently advanced.

In proportion as the breed of cattle has improved, so has the necessity of care increased. It is a question of economy whether it is not best to bring cows in at night all through the year, for they spoil much grass, and are not benefited by being in the dewy grass too early in the morning; and the manure would be in the yard, where it is valuable, instead of under the fences, where the cattle would naturally lie for protection.

Perfect cleanliness in every part of the cow-house is of essential importance; the stalls should be kept clean, the walls free from cobwebs and dust, and the mangers clean also. Much of the benefit of good food is lost by giving it badly prepared or in uncleanly boxes. The importance of ventilation is very great, but its benefits will be in a measure lost if the interior of the house is not kept clean. Another point to be attended to is the bedding and littering of cows; in many cases this is grossly neglected, the animals being kept in a very uncomfortable condition. The long straw as generally used is not economical; it is most efficient if cut with the straw-cutter. Less straw is required in this form than if used long, and it not only admits of the droppings being lifted easily away without disturbing the rest of the bedding, but it is in the best condition for the manure-heap. Sawdust also forms an excellent bedding, as do chaff, leaves, etc.

**THE ART OF MILKING.**

Another matter to be attended to, to keep the cow in profit, is to see that she is milked properly. As a general principle, cows should be milked twice a day, and the time should be regular, say at six in the morning and six in the evening all the year round. If after calving, in the early state of milk, it should be found that the bag becomes too full from extreme heat or other cause, it will be
advisable to reduce the bag in the middle of the day; but some judgment is necessary in putting this into practice, as too great eagerness in relieving the bag may have an injurious effect by weakening the power of retention. Before and during the time of milking the cow should have some good hay or meal. It is beneficial in two ways: it is a wholesome stay to the stomach; it engrosses the attention of the animal and keeps it quiet during the operation; it helps to sustain the stomach of a large yielder, drained by the flow of milk, and needing extra sustenance for the growth of the unborn calf. This should be done even during pasture-time, say a quart of good bran at each milking; and if fed to them under a shed in the field, where they could be fastened in stanchions, it saves all necessity for driving the cows, it keeps them quiet, and saves the time and temper of the milkers in fly-time, and surely increases the yield and easy flow.

The hands should be dry and clean; wet hands chap the teats in cold weather, and want of cleanliness produces warts. The last milk withdrawn is richer for the production of butter—one pint than two quarts of milk first drawn off. Imperfect milking will also dry the cow much earlier than if properly milked, and tend to decrease the quantity. A few days prior to calving, should the bag be much distended, it should be thoroughly relieved.

Whatever may be the cause of the restlessness of the cow during milking, gentleness is the only treatment that should be allowed. A young animal never forgets ill-treatment, and will withhold her milk.

We have thus endeavored to gather the experience of those who have made the nature and management of cows a lifelong study; and if we have presented nothing new to experienced farmers, our object will be gained if they will only put into practice what they know already, and not treat cows with indifferent care, and expect the same rich returns from their investment as if they were properly cared for. Remember that all nature is alike, subject to the same natural laws, and none of these can be violated without paying a penalty. Get a good cow of the best breed for your purpose; not only select it with care, but keep it in good condition for profit, and in the long run it will pay you better than if neglected. We have a subject not only of great interest to all of us, but as much might be properly said upon each one of the topics treated as has been said upon them all combined.

POINTS IN COWS.

Points in stock are the badges of purity. What are known as "points" are certain conformations, outlines of shapes and marks
of color which specify that the animal possessing them is truly and distinctly a member of the class demanding the specifications possessed. The average farmer gives but little attention to the finer points, but with his experience and habit of association judges very critically at times. While farmers are seemingly anxious to improve, they endeavor to do so without knowing in which direction to benefit themselves. Nearly every farmer claims to be an expert at selecting milch cows, yet in breeding his stock he does not consider first what he is to breed for. Does he stop to consider whether he wishes the offspring of his favorite cow to be a superior milker or a great butter-producer? The influence of the sire is to be considered above all others in such a matter. Jersey bulls are scattered far and wide now, and are within the reach of all, and yet the dairyman who sends his milk to market, and cares not to make butter, is foolish in patronizing Jersey bulls. The Jerseys are for butter-producing only, and are not heavy milkers. The milk such cows give is very rich; it is almost pure cream; but it does not come up in quantity. The farmer who desires large yields of milk from cows should seek to have transmitted to his young stock the blood of the Holstein or Ayrshire; for, although the milk from cows of these breeds is not as rich in quantity as that from the Jerseys or Guernseys, it greatly excels them in quality. Thus, those farmers living within reach of cheese-factories can best promote their interests by selecting Holsteins or Ayrshires for improving their stock, while those who send butter to market should have nothing but the butter-producers.

A great milker shows her qualities in her looks and make-up. The eyes and hair also give good indications. The first point for a farmer’s observation, and the principal one, is to observe that she does not show a tendency to become “beefy” or rounding, with points that denote good fattening qualities. A first-class cow does not get fat as a rule, but is rather bony and ugly-looking. The shape of the Jersey should be deer-like, with a large, mild-looking eye and soft feeling of hide to the touch. The udder should be full, reaching far up at the rear. One of the most prominent points is the large milk-ducts (sometimes as large as a person’s arm) running from the udder to the middle of the stomach. They are sure indications of good milking-qualities. Jerseys have black nozzles and tongues, the udder being usually smoother than in other breeds, and velvet-like when examined by touch. The Holsteins are a very large breed of cows, equalling the Shorthorns in size, but largely excelling them in milking-qualities. The young male calves from such cows can be kept with profit, as the Holsteins,
when fed for the purpose, make not only good beef, but equal to the best. Oxen from this stock are nearly equal to the Devons. Their color is usually black and white.

But in endeavoring to breed for milk it should not be forgotten that all the excellent characteristics are rarely found in a single breed. Thus we must not expect to find good milkers among the Shorthorns, nor have choice beef from the milch cows. A cow cannot make milk and beef at the same time. If her tendencies are toward milk, she will be hard to fatten; if she keeps extra fat, it means that she is a better flesh-former than milk-producer. A great deal depends on the feed, as a matter of course, but the breed must first be taken into consideration if an increase in the herd is contemplated.

Now, no matter in how many points the farmer's experience and judgment may serve him, there are some animals that will fail in their milk when pregnant, and it is exceedingly difficult to distinguish them. They are generally the plumpest, roundest and most attractive-looking cows, and should be avoided, because they are not profitable. By the marks on them which Guenon has pointed out they may be avoided. It is rather difficult to describe these points without the engravings, but they will be found delineated and described in How to Select Cows, sent by mail by the publisher of this volume upon receipt of fifty cents.

STALL-FEEDING CATTLE.

Breeders differ on this important subject. A good way is to give turnips in the morning, followed by hay, chopped stuff, at noon; then some hay again; turnips in the evening, followed by hay to last through the night. Exercise a little daily, affording the animals an opportunity to drink when out for exercise. In the Ontario Agricultural College at Guelph, Canada, the following is the time-table adopted for feeding stalled cattle in order to fatten as rapidly as possible: 7 A.M., turnips and hay; 8.30 A.M., meal and bran; 11.30 A.M., turnips and hay; 1.30 P.M., meal and bran; 4 P.M., turnips and hay; 8 P.M., meal and bran. Exercise for about twenty minutes daily, and water, though they rarely drink when fed turnips three times daily. The average quantity of food given is as follows: sixty pounds turnips, twelve pounds hay, twelve pounds grain, and three of bran.
HORSE POINTS.

It is action in the horse that sells. This is obtained when we have the complemental power in the muscle, the greatest leverage from the bones and quality in the tendons, health in the ligaments, and truth in the disposition of the limbs. We adjudicate on the horse's hind quarters as a whole. All horses with any pretensions to quality or family possess length and straightness from the hip to the tail. This is especially graceful and horizontal in the thorough-bred.

1. Length from hip to hock is the criterion both of speed and power. All horses of value are "well let down" in their quarters, affording increase of length and volume in the muscles, power and speed accruing. The haunch-bone and thigh-bone—the first strong and long, the second strong, of average length. This naturally varies with breed, but in all classes it is most important that the thigh "be well let down into the hock." Muscular development here cannot be too "immense." Good gaskins afford material help for getting through the dirt.

2. At the articulation of the haunch and thigh-bone we find the stifle in situ. A good one, without exception, is high up, abutting the flank. This is the concentration of power in all classes; it is a certain sign that the haunch-bone is well sloped forward, and that the thigh-bone is well carried back.

3. The hock we have previously determined on, but as to the fore legs I counsel young beginners to avoid weak, ill-defined knees. So also have as little to do with horses whose os calcis, or point of the hock, is ill defined. Remember puff and gum are weakness. The os calcis contributes leverage; it is evidence both of power and speed.

The hind cannons, or metatarsal bones, must individually be straight, with just a soupc on of inclination forward. They should be flat and short. Breadth under the hock here is strength, the sign of quality. Feel tendons along their course, that the legs, as in the fore, are clean in the tendons (broad and flat); the sesamoïd bones, at the upper portion of the fetlock-joints, well pronounced.

How should I feed oats to my horses?

Boiled oats are best for very young or very old horses, on account of their immature or defective teeth; but for mature horses at hard work feed dry oats. Soft feed induces perspiration.
BLANKETING.

Should I cover my horse at once when I bring him into the stable in a heated condition, or let him cool down before I put on the blanket? Do neither. A half hour before your arrival at the stable work him slowly, and let him cool down on the road. But if he does arrive in a heated condition, throw an old blanket over him and walk him till he cools down. Then rub him down till very dry, and when quite cool put on his blanket, and water and feed him.

WORMS.

A horse troubled with worms will become very thin, no matter how well fed—will have a desire to rub his tail on everything possible, and dung after, a little at a time. So get rid of them, and improve the condition of the animal. Prepare by giving a drachm dose of tartar emetic morning and night in bran mash. Give neither hay nor oats for three days; at the end of that time administer one quart of raw linseed oil and two ounces of spirits of turpentine, mixed. Give the dose on an empty stomach, and exercise that day and the following morning; after which purgation will ensue; after which feed as usual.

INTERFERING.

This is best treated by getting the animal into a healthy condition, as the trouble in very many cases is due to weakness of the system; at the same time proper shoeing should be attended to.

HEAVES.

What is the best treatment for heaves?

It is rarely cured, but with care may be greatly relieved. The food should be carefully regulated, so that the horse is not allowed to engorge himself either with hay or straw. The hay should be clean and free from dust. At the same time procure half a dozen powders from your druggist, each composed of powdered opium one drachm, and acetate of lead half a drachm; one powder to be given daily in his feed, or, if he refuse to eat the powders, administer in a little water.

Proper Ages of Reproduction (1), Length of Power of Reproduction (2), and Periods of Gestation (3) in Domestic Animals.

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THE WINTERING OF BEES.

By D. A. Jones, Beeton, Canada,
One of the most Successful and Advanced Bee-keepers in the World.

WINTERING IN BEE-HOUSE.

To do this successfully, the house should be so constructed that the outdoor temperature cannot affect that of the bee-house; and in order to accomplish this its walls should be packed tightly with two feet of dry sawdust or three feet of chaff—packing overhead same thickness, and the bottom so protected that no frost can penetrate. Next, it should have a ventilating tube at the top of not less than one square inch to each colony of bees. It should have sub-earth ventilation by means of a tube laid below the depth frost will penetrate, and from one to three hundred feet in length, coming in contact with outside atmosphere at the other end; as air passes through this it is tempered by distance, and comes into the house at an equal temperature. By means of slides at these ventilators the temperature can be arranged in the bee-house, which should stand from 42° to 45°, and in no case should it fall lower than 40°. Now, if a bee-house is constructed in this way, it will not change its temperature more than from 1° to 3° during the winter, and can be regulated, as before stated, by means of ventilating slides.

Preparation for.—All this must be done in the fall. They should be strong in bees, plenty of young, and should be crowded up to have no more comb than they can cover, and their combs well stored with pollen and honey (say twenty to thirty pounds of the latter). If you have not this quantity of honey, feed granulated sugar and water (two pounds of the former to one pound of the latter), brought to a boil before feeding. This makes a good and even better feed than the best of honey, and should be fed in time for bees to seal it over. Commence feeding immediately after first frost has killed the flowers. No glucose should ever be fed. Winter passages should be made through combs, and allow space of half an inch between combs. The last sunny days in fall remove the lid and cloth from hives, and allow the sun to shine in. This purifies and dries them; then put on a cloth free from propolis; that same evening carry bees carefully into the house, placing them on a bench ten to twelve inches from the floor or ground; this keeps bees out of the carbonic acid gas, which sinks to the lowest part of the bee-house, and is given off by the bees in the hive. The lids should be removed, and only cloth or cushion of chaff or sawdust allowed to remain on hive.
When one row has been placed two to six inches apart on benches, put strips one to two inches wide on rear and front of hive, and upon this place another row, having upper row in such a way as to have space between the hives in the second row over the centre of hives in first row, thus allowing moisture to escape; and so on, taking care to have stronger stocks in first row; leave entrance wide open.

Two thermometers should be placed in each home—one opposite bottom row and another opposite the top, the former indicating 42° and the latter 45°.

Keep house perfectly dark, and let them alone until you set them out in spring, unless they show signs of dysentery by soiling the entrance of their hive, in which case take them out quietly on the first favorable day and give them a fly. Have tight-fitting triple doors, making two dead air-spaces.

**WINTERING IN CELLAR.**

The same preparation in the fall and management throughout the winter are necessary here as in the bee-house. Place them at least two feet from cellar-bottom, temperature same as bee-house.

Do not allow any decaying vegetables in the cellar with the bees. If they show signs of dysentery and the weather is fine, give them a flight, being sure to always put them on the same stand again after first flight. Never leave them out over night, but put them back in the cellar after they return from their flight. Set out of bee-house and cellar the first favorable weather when pollen appears.

**WINTERING IN CLAMPS.**

Prepare the colonies the same as before. Make a platform six inches above the ground, and wide enough to have from ten to twelve inches of space in front of the hive, twelve to fifteen inches at rear of hive, and platform long enough to hold all your hives. After placing them four to six inches apart, if there is any space in rear of division board, pack it with dry sawdust or chaff; remove the lids and put clean cloths on the frames, or, if a box hive, bore half a dozen inch holes in the top of the hive, and these, covered with cloth, allow moisture to pass up into the packing above. Place a stick half an inch thick each side of the entrance, long enough to reach the edge of the platform; upon these lay a board. By means of this there will be a communication with the outside at all times; then drive stakes at the front and rear of platform; set up boards all around this platform inside the stakes of sufficient height to allow packing eighteen inches above the hive; pack firmly with dry sawdust or chaff around and between the hives and about eighteen inches on top; then lay boards on the top of the packing; upon
these place stones or other heavy weights (one hundred pounds on each hive is not too much). This will pack firmly, and prevent heat from passing up through it from the inside of the hive, and yet allow moisture to escape. The packing should not be removed until about fruit-blossom, except slightly to examine condition of colonies.

This clamp should be banked outside sufficiently to prevent frost from getting under; if sawdust were packed under the clamp it would be better. A slanting roof keeps off rain and thawing snow.

**BOX WINTERING.**

Where parties have only a few colonies, old dry-goods boxes may be taken, the bees placed in them and packed in a similar manner to a clamp; but there should always be six inches of dry packing under the hive, preventing frost from below. Take care to make the entrance perfect, thus enabling them to have access to the outside.

**WINTERING IN CHAFF OR SAWDUST HIVE.**

These hives are intended to winter safely without any outside packing, only requiring the same preparation as those for the bee-house—viz. strong in bees, plenty of young bees, plenty of stores (if not sufficient, feed); crowd up on few combs; cut passage in comb, the combs half inch apart, and fill up the space in rear of division board with dry sawdust or chaff, filling the space between the combs and the lid with the large cushion.

**MANAGEMENT OF BEES.**

In judging of weight you must remember that old comb weighs more than new, and allow several pounds more for old colonies than for those which have been put into the hive this season. Never allow less than twenty pounds to a colony, even when intending to winter indoors; when left outside, thirty pounds is none too much to give them. If a cold, backward spring succeeds a hard winter, the extra amount may save the colony; and if it is left over, it will not be wasted, but the bees will raise more brood and store in boxes earlier. If you find weak colonies, mark their hives, so that you will remember them, and after flowers are gone two or more may be united and form good colonies.

If the season is favorable and swarms come early, they may be robbed on or about the 1st of July. If the season is not good, present year swarms should not be robbed. Older swarms may be robbed about the same time, but not later.

The leading feature in the natural history of bees, and one which distinguishes them from almost all other insects, is their singular
distribution into three different kinds, constituting, to all appearance, so many different modifications of sex. The drone (fig. 1), which is characterized by a thicker body, a round head, a more flattened shape, and more obtusely terminated abdomen, within which are contained the male organs of generation, is undoubtedly

the male of the species. It is distinguished also by the absence of a sting, and by the humming noise that accompanies its flight. The queen-bee (fig. 2), which is unequivocally recognized as the female, is larger than any of the others, has the abdomen of greater length, and is provided with a sting and two ovaria of considerable size. The worker-bees (fig. 3) compose the third class, and are distinguished by the smallness of their size, their lengthened proboscis, the peculiar structure of their legs and thighs, which are adapted to the collection of certain materials obtained from vegetables, and by the apparent absence of every trace of generative organs. We say apparent, because rudiments of ovaria do exist, which, however, are not perceptible without a very minute and careful dissection. Till recently the worker-bees were regarded as devoid of sex, and were accordingly termed neuters. It is their function to perform all the laborious offices for the community, to construct the interior of their habitation, to explore the country in search of nourishment and other materials, to collect and bring them to the hive and apply them to different purposes, to attend upon the queen and supply all her wants, to defend the hive from the attacks of depredators, and to carry on hostilities against the various enemies of the tribe. The life of the queen is chiefly engrossed with the duties of laying eggs. The drones, producing neither wax nor honey, and depending on the rest for their subsistence, are idle spectators of the others' labors. They appear to be formed only for the momentary but important duty of impregnation, since they perish when this purpose is accomplished. There is commonly only one perfect queen existing at a time within each hive, and she usually appears to be treated by all the other bees with every mark of affection and of deference.
NOTES AND SUGGESTIONS.

The farmer's most valuable crop is a crop of ideas. Cultivators of the soil are every year realizing the advantages of gathering from books the views of scientific men and a knowledge of the practices of other farmers, that they may, by comparing them with their own, improve their theories and their systems of farming. No farmer can afford to neglect agricultural reading. The exigencies of the time make new crops profitable; they introduce new notions, open new markets, and give us new views upon agricultural as well as upon political and humanitarian subjects. The following will, therefore, prove invaluable to the careful farmer. Most of these notes and suggestions having been contributed by those who have fully tested their value, they embody the result of years of study, experience and trial.

Buildings.—Keep everything neat and tidy within and about the buildings; tools, tools, chains, etc. left out may be covered up in the snow or mud and easily lost.
—Clear roofs from too heavy snow, stop leaks, keep eaves-troughs free, paint where needed, fasten loose boards, keep manure away from sills, oil rusty hinges, see that fastenings are in order and all repairs promptly made. Get out timber for sheds sufficient to shelter all stock. Study economy and convenience in plans.
—Paint in cool, damp weather, so that the oil will remain on the surface, and not be absorbed by the dry and porous wood. When buildings settle unevenly, let them be levelled up at once, as standing on an uneven foundation strains every part and breaks the nails and cracks the walls.
—Put every building in order for winter. Loose shingles and boards should be nailed; the large cracks between ridge-boards need closing up with long nails; and the siding should sometimes be taken off, jointed and replaced, to exclude snow and keep rain from rotting the timbers. Wherever the ground descends toward the foundation walls a few loads of earth should be hauled in, to turn the surface water off before the ground freezes, as the expansion of the earth will often crowd walls inward after freezing a few times. If the ground descends from the wall, the water will be carried away, and the expansion will be less forcible against the wall. Make a little mortar and stop all crevices, not only in the walls, but between the sills and foundation, to exclude cold air from the apartments of animals.
Barns.—Clean out thoroughly during rainy weather. Begin at the top and sweep down all spider-webs, chaff and mouse-litter from the beams and girders. Turn over loose boards on the ground floors, and brush out wire-worms, sowbugs, centipedes and all other insects that exist there and in cracks. Where there are large cracks in the upper sides of beams, fill them with coal tar, and then scatter clean sand over them, so that it will settle into the tar. This preserves the timber and also repels insects.

— Where a small quantity of hay or straw remains in the bottom of the mow, pitch it up aloft, where it may be used in the former part of the foddering season. Remove manure wherever it is in contact with wood-work, and see that driving storms do not wet the frame timbers. Clean and paint eaves-troughs, and remove limbs of trees within a yard of the sides or roofs of buildings.

Barnyard.—Turn all water from the roofs of buildings or other sources away from the barnyard. If the ground be wet, make a good under-drain entirely around, and excavate the middle, puddling it with clay protected by cobble-stones, so as to retain all the liquid manure.

— Before the ground freezes scrape all the fine manure into heaps and haul it to meadows or pastures for a top-dressing. It will act as a mulch to the grass roots. Clean out all surface ditches near the yards, and cut shallow channels where they are needed, to prevent surface water from flowing into any part of the yard. Remove all stones and sticks liable to be covered with manure and hinder pitching.

Stables.—As the warm weather comes on see that stables are thoroughly cleaned out and well littered and ventilated, but horses should not be exposed to cold air-currents, especially at night.

Cellars.—Do not neglect to clean them out thoroughly, removing all decaying vegetables, wood, etc. Where cabbages or potatoes have lain and decayed in part, it is well to sprinkle dry ashes or fresh loam, removing it after a day or two. Whitewash every part except the floor, which may well be sprinkled with lime.

Fencing.—Poor fences make bad neighbors.

— Ply the bush-hook to hedges and keep down the brush; let no weeds go to seed.

— November is a good season for cleaning up fence rows. Take the fence up altogether. If you need a fence, set it up again a rod away, with the tops of the post on the ground and the butts in the air (supposing it to be a post-and-rail fence), supporting the butts by forked stakes. This leaves all clear, and the old ivy-grown, briery, weedy, stony strip can be grubbed and plowed and cleaned.
up, sowed to grass and the fence replaced. It is no great job, and if forty rods could be treated in this way every year, it would soon make a difference in the looks of most farms that would be much for the better, and increase their value.

Machines.—Decide at once what kind of machines and implements will be needed the present season. Reapers and mowers, threshing-machines, cider and wine mills, should be ordered in time, so that there need be no delay. A long time often elapses after such machines are ordered before they can be forwarded. It is far better to receive them before they are needed than to be obliged to wait for them. See that every laborer has a good tool. A man who attempts to work with a poor implement will, in a short time, expend time and strength enough to purchase a new one.

— Get in your orders for mowers and all heavy implements early, so as to be well and promptly served; and delay no needed repairs.

— Purchase no new kinds but those that have been well tested. Look out for such as will require the least force to work them. If possible, procure those made near home, that in case of a breakdown they may be repaired at the least expense. If a wheel of a reaper or mower were to break, and one were obliged to send four or five hundred miles to the factory for a new one, he would probably sustain much loss before it could be put in running order again.

— During rainy and leisure days examine mowers and reapers to see if they are in running order. Take them apart; remove gum and dirt from the journals and boxes; oil afresh, and screw up all nuts and tighten loose rivets. The efficiency of tools and implements depends almost altogether on their condition.

 Implements and Tools.—Begin in good time to procure new tools and implements of husbandry.

— Have all in repair and readiness for spring work. In the end, buying is cheaper than borrowing. Consult advertisements, send for catalogues and circulars for information about new implements, and always get the best.

 Implements.—If there is no room in the sheds for implements, pack them together and improvise a roof of boards tacked together; by no means leave them exposed to the weather to be rotted.

 Tools.—Keep all implements under cover or in the shade during hot weather. The sun warps and cracks the woodwork of scythe snaths, rakes and forks, and when they are covered with dew a thin scale of rust is soon formed on the bright surfaces of iron and steel, all of which injure them more than ordinary use; alternate rain and sunshine will often straighten bent pieces of wood.

 Rakes.—Do you own a horse rake? If not, it is time to procure
one for raking hay and grain stubble. As a horse rake is used only a few days in a year, it will be a matter of economy to employ a pair of light buggy or carriage-wheels for carrying the rake, and the axle arms may be ordered to fit such as you have. By procuring a good wheel rake, a lame man or an active young woman can do all the raking.

Tedders.—When a farmer has much hay to make, it will pay to procure a tedder and keep it in constant operation until the hay is fit to rake. Grass will cure much faster when it is flying through the air than when it remains on the ground.

Draining.—Before the soil is fit to plow let it be examined for the purpose of ascertaining whether or not some portions of it may not be drained very advantageously where it is excessively wet. Let wet portions of a field be staked out and drains cut for tile, stone or wood. During the month of March a long line of under-drain may be made before the soil is fit to plow, if the proprietor only has energy enough to lay out the work and commence it at once. If it be delayed until the soil is fit to be plowed, and other work begun, the draining will not be done.

—Examine under-drains all over the farm in wet weather, and see that surface water does not work in and displace the tiles or fill the channels with earth. Shovel away all sediment at the outlets, so that the water will flow out freely. A half day's work cleaning out ditches and surface-water channels may be very profitably laid out on every farm.

Ditching.—Should the season continue dry, ditching in the swamps is in order. In muck swamps dig the main ditches deeper and broader than necessary, say two or three feet wide at the bottom, and eight or ten at the top, and throw out the muck on one side to lie and freeze until spring, while the tussocks and sods are thrown by themselves, to be burned next summer when thoroughly dry.

Improvement.—This should be the watchword of farmers during the entire year. Improve the fertility of the soil by a better system of management, and by making more manure. Improve stock by disposing of inferior animals, substituting better ones; and improve the man himself by reading good agricultural papers, and in every way gaining and communicating useful knowledge.

—As soon as the frost is out and the ground is settled, it is well to go over the land and pick off the stones that have been heaved up. On much land the grain is benefited by rolling, especially when it has been thrown out by the frost. On other soils this is injurious. Top-dressings of ashes, ashes and plaster, superphosphate,
guano, ammoniacal salts or similar substances which can be sowed by hand, usually produce good results, especially if the grain is winter-killed in spots or does not look thrifty. Coarse weeds may often be pulled easily or cut up with a “spud” in April.

— Keep fences in good repair around your grain-field, and confine turkeys and all other fowls that persist in going on it, as they will break down and destroy more than they are worth.

_Burning Brush and Rubbish._—Where this has been cut along the fences on the road, or between fields late in the summer, and is now dry, burn it and spread the ashes on grass land. It only harbors vermin, mice, rabbits and insects.

_Roads and Paths._—If every one does his full share (and a little more) toward breaking roads and making paths about the neighborhood, general comfort will be enhanced.

— Level down the sides of the beaten track of the highway. In many localities the sides of the highway are mowed, and the grass yields a good burden of hay. Where the earth is liable to be washed away during heavy showers sow Kentucky blue-grass or red top and form a sod, so that transient streams of water will not wash gullies in it.

_Roofs._—Examine roofs of out-buildings when it rains. Leaky places will usually be found where a shingle has been split directly over a joint of the next course below. In such a case another shingle may be driven beneath the split one.

_Weeds._—Wage an unceasing warfare against weeds and bushes. It injures Canada thistles, ox-eye daisies and other perennials materially to cut them close to the ground just before they blossom.

— Rally all the available force of the farm, and with sharp hoes cut all the bull-thistles, teasels, mullein and other biennial plants that will mature the seeds the coming season. Cut them about two inches below the surface of the soil; the surface water will stand in the little excavations and enter the roots and destroy them.

— In many pastures large bull-thistles cover nearly one half the ground. They should be mowed, not only to allow the grass to grow, but to prevent the seed blowing over the country.

_Stones._—Both large and small ones may be hauled off the field as soon as thawed loose, before the soil has become soft. If the ground is soft, pry up the large stones on meadows and place billets of wood or small stones beneath them, so that they may be hauled off as soon as snow has fallen or the ground will bear up a team. Remove brush, logs and other rubbish from fields, if likely to be in the way of the plow.

_Yards._—Grade and drain barn and stable yards for winter.
Level up low places by hauling in hard and heavy earth in time to allow it to settle before heavy rains in autumn. Where the surface is uneven, plow down the knolls and ridges and make the surface quite level and smooth in the summer.

Fallowing.—Rather than allow a good soil to lie exposed to the burning sun for several months, sow three or bushels of Indian corn per acre. In six weeks there will be a good burden of green manure to plow under. Fallowing good land tends to impoverish it.

Plowing.—Never plow heavy soils when wet, because as soon as the surplus water has settled away they will be as compact as before. Plow dry portions of a field first, and aim to plow heavy soils when they are just moist enough to pulverize well. Never plow with dull share or point, and grind every part of the plow until the earth will slip off readily. If earth adheres, a plow runs harder, holds harder and does its work imperfectly.

Irrigation.—Tons of good fertilizing matter are carried off in small streams which might be conducted over farms, especially grass lands, with great profit. Turn streams of muddy water from the highway on fields, so that it will spread over a large surface. Fine earth, horse-droppings, etc. washed from the beaten track will increase the quantity of grass quite as much as a top-dressing of manure, and the water, aside from what is suspended or dissolved in it, is of great benefit.

Hoeing.—The object of hoeing corn and root-crops is not simply to keep down the weeds and to draw a little fresh earth about the roots, but it is primarily to stir and loosen the surface, that the air and rains may have free access to the soil in which the roots are. The frequent passage of a light cultivator or horse-hoe is of great benefit to crops on land suffering from drouth.

Rotation of Crops.—Raise crops that are best adapted to the soil, rather than attempt to adapt the soil to the crops. Every farmer should adopt some kind of a rotation, if he has not already done so, as this is one of the fundamental principles of scientific agriculture.

Manure.—Use all diligence to increase the manure and compost heaps.

— Manure is like money. No farmer ever has too much of it who appreciates in what his wealth lies. The days of profligate waste of manure, even on the prairies, are fast coming to an end. Make a tank for liquid manure, to save all that leaks from the dung heaps, and all the urine of animals, to be pumped over the heaps again, or used in the liquid state diluted with water, being applied by the field sprinkler.

— Spread horse manure over the heap, and never allow it to heat
and become fire-fanged. Haul manure to distant fields while there is sleighing, or before the ground has thawed, when the soil would be so wet that it would be injurious to drive over it, and when a team would be unable to haul off a load. See that the rain from the eaves of buildings or from any other source does not wash away the soluble portions, the best part of barnyard manure.

— If possible, spread a good dressing of barnyard manure upon corn ground, unless you have a short supply and it is fine enough to be applied in the hill. When barnyard manure is hauled to the field several weeks previous to being plowed under, put it in close heaps to prevent loss by evaporation, and if possible shovel a little soil over it. Spread no faster than it can be plowed in. Make a compost rich in manure, when fine muck can be obtained, for manuring Indian corn in the hill. Where dung-heaps leak, devise some means for pumping over it the liquid which leaches from them.

— Collect barnyard manure into covered quarters, or protect as much as practicable from alternate rain and sunshine.

— Grassy sods, the tops of the roots which cannot be fed out, leaves, and wood or swamp mould, and all such things, add both bulk and value to the heap.

— If care be taken, an immense quantity of weed-growth may be converted into good manure, either by throwing it in the hog-pens, or by making a regular compost of it, putting it in alternate layers with any fermenting manure, or piling it up and pumping liquid manure over it. Cows brought to the yards nights, and fed an armful of grass or green corn each, cut in the morning, and thus well wilted, will drop manure enough to pay for the labor over and over again, if it be only well collected and composted.

Lime.—An application of lime will be found useful upon any kind of soil at least once in five or six years. It is generally used at this season with a fall grain crop. But where lime is employed it will be useless to apply superphosphate, as this combines with the lime and becomes simple phosphate of lime, which is insoluble.

— It is well to keep a supply of lime on hand, but not make much at a time. It assists greatly in ameliorating stiff clays, in composting muck and weeds, etc., and checks the ravages of insects.

Tanbark.—When teams have little to do and laborers are at leisure, haul spent tanbark and deposit it in some dry place for littering stables next winter. Dry tanbark is an excellent absorbent of liquid manure, and it will pay to haul it, as well as sawdust, one or two miles. In summer it can usually be obtained readily. In autumn it is sometimes scarce.

Wheat.—Procure in time good seed of spring wheat of the best
CULTIVATED CROPS.

farmers. Get the last year's wheat floured in order to have bran for feeding.

— In different localities one kind appears to succeed better than another. Drill in or sow in good season. If sowed early, unless the land is very wet, the young plants will root deeper, tiller more, and the yield of grain will be larger.

— In localities where winter wheat will be fit to harvest the last of July, see that everything is in readiness before the grain is fully ripe. Wheat makes more and better flour if it is cut before the heads droop, before the kernels have passed the "dough state." Leave an acre or more of the earliest and best to ripen fully for seed. Wheat makes better flour to put it in shock as soon as cut, rather than to sun it in the swath, as is sometimes practised. In lowery weather cover the shocks with hay-caps.

— Where wheat is sown after barley or oats, the land should be plowed as early after harvest as possible. If this cannot be done at once, harrow the land to break down the stubble and destroy weeds and cause the seeds to germinate. The rubbish will act as a mulch and keep the ground moist, and it will plow easier than if left unprotected to bake in the scorching sun. The fallows must not be neglected. Get every thing ready, but do not be in too great a hurry to sow. If the land is in good condition, from the 5th to the 25th of September is the best time. To prevent smut, an effective plan is to dissolve, for each bushel of seed wheat, three ounces of blue vitriol in one quart of water. When cool sprinkle it over the wheat, and turn carefully until every seed is completely moistened. Old wheat will require three pints of water to each bushel. The seed wheat, after being treated with the vitriol, may be kept for days or weeks without injury. Wheat is sometimes treated with brine to prevent smut, but we have always thought it rather risky.

Harrowing Wheat in the fall should only be done when the surface of the land is dry. No kind of cultivation should take place when the ground is wet. Experimental cultivation should be done as early as possible. Deep plowing is not needed. To kill weeds and mellow the surface are what are wanted. Harrowing may be done safely two weeds after sowing, and repeated twice or thrice.

Wheat and Grass Fertilizer.—Wheat needs nitrogen in October, and so does the grass. One hundred pounds per acre of nitrate of soda would be a help to both.

— Make timely calculations to commence harvesting grain before it is dead ripe. When it is to be threshed soon after it is cut, stack it close to the barn doors, and run the straw into the barn. By this means a large amount of fodder can be saved in good order.
— The sooner grain is thrashed, the more there will be of it. It should, however, be thoroughly dry. Small farmers will improve rainy days as they come by thrashing by hand if waiting for the thrasher.

Barley.—If the soil be in a good state, sow as soon as the ground will do to plow. If possible, obtain seed free from oats, buckwheat and spring wheat, as all such grain is a nuisance when the barley is malted. Always keep the two-rowed, four-rowed and six-rowed barley separate, because, during the malting process, different kinds will not malt in the same time.

— Cut before it is dead ripe, and cure with care, as the grain will be heavier and brighter, and command a greater price in market, and the straw will furnish a great amount of fodder.

Oats.—Sow as early as practicable. Drill in both ways, using half the desired quantity each time. Sow not less than three bushels per acre, with all the light kernels and foul seeds removed.

Peas or Peas and Oats.—It is best to plow in the peas, and harrow in the oats lightly. Sow before the middle of the month. Peas alone may be sown later on good soil. The mixed crop is satisfactory.

— Where oats fall down before the panicles are formed, they had better be cut at once and cured like hay, as they make excellent fodder. Grain does not fructify well after the straw has fallen down.

Rye.—Sow spring rye as soon as the soil has settled and is dry enough to plow. The straw will be needed next fall for binding cornstalks, and it is considered better than other straw to cut for horses. The grain makes the best kind of meal for teams.

Buckwheat.—Do not sow more than one bushel per acre. Twenty-four quarts of good seed are sufficient. Buckwheat may be sowed after barley in many localities, and ripen before frost. Sow the seed very evenly, and roll the ground where there are any small stones or clods, in order to have a smooth surface on which to harvest the grain.

— This crop, being easily injured, should be cut after the first light frost. Low grounds should be cleared first; upon high ground the crop will not be touched by light frosts, and here it may be left later. The grain shells so easily that it should be harvested early in the morning when moist with dew. After lying a few days to cure, it should be raked up when it is moist.

Beans.—Where a hill of Indian corn has failed, plant three hills of early beans. If rows be far apart, a row of beans is often planted between them at the last dressing with a horse-hoe.

— Field beans may be planted as late as the middle of July.
where early potatoes have been dug or where Indian corn has failed.

— If wet weather occurs when beans are ready to pull, it is necessary to protect them from the rain. This may be done by driving stakes in the ground and stacking the beans around them, and then covering the top with straw. In pulling beans by hand, three or four rows may be thrown together and left loosely, so that they will cure. Then, in case of threatened rain, they may be quickly gathered into stacks.

— Dry and shell all that are unripe before freezing, as they will make good feed for sheep; freezing before they are ripe spoils them.

Corn.—The season at the East is early. There is danger of a cold May. Have at hand early maturing seed, to plant in case that first planted fails. It is poor policy to be in haste about planting corn. It comes up much surer, and does better, planted after the ground is warm, when hot weather is not far in the future.

— Keep the horse-hoes and cultivators in motion among the growing corn. Use a short whiffle-tree when the stalks are so large as to break off easily. Straighten up all hills that are not disposed to grow erect. Hot weather is the best time to work among growing corn. Better pull than to cut large weeds; Indian corn does not need root-pruning. Corn should be cut as soon as it is ready. Early corn will be much more valuable when cut green than if left to be killed by frost. Frosted corn-fodder will not cure well, and is damaged for use. When the grain is well glazed and hard on the surface, the crop may be cut.

Smut in Corn.—Smut is poisonous, or at least very injurious, and care should be taken to prevent it from being eaten with fodder. It is becoming very common in corn. It might be well to pass through the cornfields with a sharp knife and a basket, and cut off all the bunches of smut and smutty ears, and carry them out where they may be burned. As one square inch of surface may contain four million spores of smut, and every spore is capable of producing a smutty plant, it is important to carefully destroy every ball of smut.

— Every day the corn remains uncut after maturity there is loss. Corn gains nothing by standing after the kernels are glazed, but the fodder loses rapidly in quality. Much of its digestible matter is changed into woody fibre, becoming hard and undigestible.

Shockling Corn.—The use of good bands will save much labor and loss. Some sheaves of hand-thrashed rye straw, thoroughly well wetted, will make tough and strong bands. What is much wanted is a permanent, and strong sheaf-band for this purpose,
which will last more than one season, and will serve for corn and other grain. Osier willows may be profitably grown for sheaf-bands.

Husk, if possible, while it is still, pleasant weather. It is disagreeable work on a raw November day, when fingers get numb and the body chills quickly.

— Spread all soft ears on a floor in an airy place, where they will shortly be dry enough to grind for feed. Save best ears of sound corn for seed.

Cornstalks are no longer to be considered as a waste product, good for nothing but to be trodden under foot. They are worth fully the cost of putting in the crop if well saved and cured. When cut at the right time, and well cured, six dollars a ton is, by many, considered a reasonable estimate of their value for feed when hay is worth ten dollars per ton. Careful experiments place well-cured cornstalks as worth about three-fifths as much as hay.

— Let the stalks be thoroughly cured before being stacked.

Hemp.—Sow on good soil, in drills or broad-cast, one or one and a half bushels per acre if broadcast—in drills less.

Pumpkins.—On under-drained manured land pumpkins do not interfere with the corn crops. They do better alone. Probably the cheese pumpkin is the most marketable and best.

Flax.—See that water does not stand at all on any part of the field. Pull large weeds while the plants are small.

Millet.—Where the soil is moderately fertile, sow millet at any time previous to the 25th of June. From eight to twelve quarts per acre is sufficient unless the seed be large. Millet grows rapidly in mellow soil and bears drouth well.

Sorghum.—When the plants are young they are very tender. They need dressing and hoeing with care. Careless men and boys will often retard their growth by cutting off the roots and burying the leaves. If the ends of the leaves be covered with earth, the growth will be checked.

Tobacco.—Weed plants in seed beds. Sprinkle with liquid manure in showery weather—with pure water in dry weather. Plow and harrow the field.

Roots.—Every farmer ought to raise roots enough to feed his horses and neat stock, including calves, from a peck to half a bushel a day on an average, and have enough for his sheep besides. Calculate to get, with good cultivation, 800 to 1000 bushels to the acre. Begin in April to prepare the soil, manuring well, plowing deeply. Harrow thoroughly. Sow parsnips and carrots in April and mangolds in May, rutabagas in June and sweet turnips in June or July.

— Every animal should be fed a few roots daily. Save a few of
the best to be planted out for seed. If you have never yet raised roots, procure seed and make arrangements for an experiment with a crop of them the coming season.

— Do not fail to raise a few square rods of rutabaghas for stock next winter. Pulverize the soil thoroughly, manure it well, and sow the seed in drills two feet apart as soon as the ground is dry enough to work after a good shower. Then a crust of earth will not prevent them from coming up.

— Sort over, remove decayed ones to be cooked and fed immediately, and keep a supply of the soundest for breeding animals, or those failing in appetite, as spring approaches. No decayed turnips, rutabaghas or cabbages should be fed to milch cows, or bad flavor will be imparted to the milk.

— Root crops must be hoed and thinned out. Most people are inclined to leave the plants too thick.

*Root Tops* and small roots may be fed to cows and young stock quite freely before they heat, which they will do quickly if in heaps. It is well to lay them on the north side of some building, where they will not become sun-dried, for thus they will be kept much longer than in any other way.

— Feed with care, so as to have some always on hand for animals with young, and for a change of diet if an animal gets off its feed.

*Potatoes.*—Assort potatoes and feed out the small ones to stock; lay the best aside for seed.

— Plant early; use no heating manure.

— Cultivate thoroughly and hoe well before the tops begin to fall over, and sprinkle a handful of wood-ashes around the stems of every hill. Never allow careless laborers to strike their hoes into the ground near the hills, as roots that would bear tubers may be cut off. Potatoes do not need root pruning. If weeds close to the hills are too large to be covered with earth, pull them.

— Finish cultivating and hoeing potatoes as soon as practicable, as the roots should not be disturbed after tubers have begun to form.

Potatoes, by the first week of November, are, or should be, all out of the ground, except possibly south of Pennsylvania and along the coast. If the ground freezes, some are inevitably injured by the severe cold.

*Turnips.*—The cultivation of turnips and rutabaghas consists in keeping free from weeds and thinning out to a proper distance. One good root at every nine inches is far better than two or three poor ones in that space.

— Turnips will resist considerable frost and grow rapidly in cool weather. If standing too thickly in the rows, thin out, using those removed as fodder. If fed to cows, they should be given at milking-
time. The flavor will disappear before twelve hours have expired, and will not materially affect the milk.

— Turnips may be left longest before digging, but repeated freezing makes them pithy and innutritious.

_Mangolds._—This variety of beet is one of the most productive and valuable to the farmer as food for stock; it keeps well until grass. Sow in deep mellow land, in rows two feet or two feet six inches apart, to be thinned to eight to twelve inches in the rows, according to vigor of the plants and strength of soil.

_Beets and Mangolds_ are protected by their broad leaves from frosts which would otherwise injure them so as to cause decay; but as soon as the leaves are wilted the growth of the root is checked, and they should be harvested and pitted at once. The same is true of carrots. They bear very little freezing, and the frosting of the leaves is the signal for rapid gathering. One of the most convenient methods is to plow a furrow close to the row, and run a subsoil plow close on the other side. The carrots may then be pulled unbroken and with perfect ease.

— The fresh leaves of mangolds and beets have an injurious effect upon cattle if fed in excess. A day or two after cutting they may be fed safely—a pressed bushel basketful at a time, sprinkled over with a handful of salt.

_Carrots_ may be sown as early as the ground can be put in good order. The Long Orange is the favorite field variety, though the White Belgian is said to be more productive; and, if so, it is better for feeding, but not for market. Sow 2 pounds of seed to the acre by hand, and 1 to 1 ¼ by machine.

— Pull all weeds near the young plants when the soil is wet. Carrots require clean cultivation. Where the seed failed to come up, put in turnips or onions.

_Cabbages._—Put out the plants in good season; apply a heavy dressing of horse manure, well worked into the soil; hoe mornings while the dew is on, working over the earth a few inches deep; and we will almost guarantee large, hard heads. Insects may make the result doubtful.

— Where the ground is rich, nice heads may be raised before winter from plants set any time in July, if they are kept well hoed. If they don't head up, they make plenty of cow-feed.

_Pitting Roots._—Trenches four feet wide and two feet deep are of a size well suited to either a moderate or severe winter. If put in too large heaps or too deep pits, roots heat, and of course do not keep well. Cover with straw, and lightly with earth patted down to shed rain, and ventilate well.
Soft Roots and hollow ones which cannot be pitted are profitably fed to either pigs, sheep or young cattle, and also to cows that are dry.

Winter Rape, for winter and spring feeding for sheep in the South, may be sown early in October. Five pounds of seed per acre, if planted in drills, or if broadcast eight pounds, will be needed. It may be fed off by penning the sheep upon the crop as soon as it has sufficient growth. The surplus may be plowed under in the spring as an excellent preparation for oats or corn. This has been grown advantageously for this purpose as far north as Rochester, New York, the sheep even leaving a warm shelter and pawing away the snow to find it.

Grass Seed may be sown upon grain, or alone, if it be done early, but much seed must be used.

— Fields may be plowed and sowed with grass seed in June without any kind of grain. Still, it is better to sow two or three pecks of rye per acre, to partially shade the young grass.

— Where grass grows very large in moist places, and falls down, let it be cut and made into hay at once. When a farmer has a large quantity of grass to mow, if he waits until it is all fit to make into hay, unless he has an abundance of help, some of it will become too ripe. This will suggest the importance of sowing different kinds of seeds in some meadows, so that part will be fit to cut a few days in advance of the rest.

Clover.—Where clover has got the start of stock in pastures, it is better to mow it off and let a new crop grow, than to let it go to seed, as animals do not relish it when it is old and tough.

Pastures.—Never allow animals to graze on newly-seeded pastures before the grass has a good start. The feet of heavy animals destroy much grass. At first let cattle graze about two hours, then yard them. On new land, where the blue-grass starts soon, feed it off early in the spring, and keep it short; few animals like it after seed-stalks appear.

— Do not feed off pastures too closely, as the grass will be a long time starting again, especially in hot and dry weather. It is bad policy to keep so much stock that pastures are always very short. The leaves of grass perform the office of lungs. Therefore, let plants have top enough, that the breathing may not be obstructed.

— Weeds in pastures and fence-corners should not on any account be suffered to go to seed. Let them be mowed at once.

— The droppings of the animals on the pastures should be scattered and spread. This not only manures the field, but prevents injury to the spots covered with droppings. A dressing of plaster over the pasture will be useful, sweetening the fouled spots, and so
avoiding the unequal character of the surface caused by the neglect of cattle to eat down the herbage in otherwise distasteful places.

*Meadows.*—Keep all kinds of animals off meadows in the spring if you would have a good crop of hay. Better pay double price for hay than to allow animals to graze on meadows. Make a light, long-handled mallet, and knock to pieces all the droppings of animals on meadows and pastures. Pick up small stones in heaps, and haul off as soon as the soil will bear up a team.

— Avoid feeding off the meadows too close; let no heavy animals go on the grass land at all in soft weather, when they will poach up and injure the sod. Turn water from the highways or uplands upon the meadows and pastures, where it will deposit much manurial matter.

*Haying.*—Commence haying in good time. Where there is much grass to cut, some of it must be mowed before it is really fit; otherwise a good proportion will become too ripe. Grass will make the best hay if cut when the stalks are full grown and the heads are in full bloom. When there are weeds among the grass, cut it before their seeds are formed. Grass is much less liable to be injured by hot and dry weather if cut when quite green.

— Store the hay as evenly as possible, so that it will come out easily. Let a boy or weak man manage the hay-fork, and let a strong man mow away the hay, as that is much the hardest work.

*Stubble Land,* especially after barley, is often full of weeds; a mowing-machine may be used with advantage to cut them. Also, in pastures where thistles and other weeds or rough grass and rushes are abundant, a mowing-machine affords an easy method of checking or destroying them.

*Mowings.*—Buy hay, rather than pasture the mowing-lands. Top-dressings of soluble fertilizers such as gypsum, guano, ammonia salts, ashes or liquid manures, are effectively applied now, much more so than stable manures or vegetable and animal composts. Irrigated meadows may be manured by putting well-rotted manure (dung and straw) into a pool from which the water, after becoming charged with its soluble portions, may be spread over the best method of manuring grass.

— Where hay or grain is put in stacks make a foundation 12 inches foot from the ground. The best way to build a stack is narrow, and to cover it with good boards placed diagonally from the top, forming a roof like the covering of a lean-to, sloping only in one direction.

*Fodder.*—Vary the fodder of all kinds of stock as much as possible within reasonable limits. It is better to change it on different
days, or even at different meals, than to make too great mixtures. Hay and straw may be mixed; ground grains, bran, oil meal, etc. may be mixed with hay, straw, stalks or roots. Feed different kinds of roots separately.

Horses.—Give horses daily exercise, either by turning them loose in a yard for a few hours or by driving them in the harness. Mares with foal should be handled with great care, and if there is much snow and ice they should be sharp-shod to prevent their slipping down, which would be very liable to cause slinking. Feed breeding mares a pint of unbolted wheat flour daily in connection with their other food, as a small quantity of wheat flour is more highly esteemed than any other meal by experienced horse-breeders for developing the growing foetus.

— Keep brood mares in loose boxes ten feet square, and when possible give each one a sunny yard to go to at pleasure in all weathers, when it is not too slippery.

— A few carrots with their grain will aid digestion and appetite, and improve their coats. Train colts so that no breaking will be needed, either of spirit or of harness. Keep working and carriage horses sharp-shod, well groomed, and blanket ed when standing out or in cold stables after exercise. Ventilate stables, and abolish high feeding-racks.

— While they are shedding their coats the skin makes heavy demands on the organs of nutrition; it is peculiarly sensitive to cold, to wet and drafts, and horses are liable to take cold. They should, therefore, be well fed and groomed, and blanket ed when exposed, quite as well as in midwinter. Be careful about letting horses that are shod get loose in the lots together. They are playful, and in their play often kick one another severely. Horses intended for the market should never be used before the plow nor for hard labor. Neither should those used for fast work on the road, nor showy carriage horses; it makes them stiff and awkward, and will seriously affect their value.

— Look to having well-fitting harness; sponge the shoulders, legs and feet of hard-working horses nights and mornings.

Cows.—Dry off six to four weeks before calving. Give generous feed of hay and oats, but not much grain. Cut hay or straw steamed, and a little bran or meal added, is profitable. Keep the skin healthy by frequent carding and brushing. Those about to calve should be turned loose into separate, roomy stalls. Watch their time to give assistance if needed, but do not interfere unless absolutely necessary, and then use gentle means. Allow the calf to have the milk for a day or two. Its effect is medicinal and ne-
cessary to the new-born animal. After calving give the cow a warm bran mash made with scalding water, and afterward her ordinary feed, increasing the amount of roots and grain to promote the flow of milk and prevent the exhaustion of the animal.

— Cows which are giving milk must have an increase of feed. Mangolds or sugar beets are best. Cut them in slices and sprinkle them with bran, and feed half a bushel more or less at a time, after the cows have filled themselves with hay or corn, fodder or grass. Soft turnips may be fed to some cows at milking-time and not flavor the milk. Keep up the flow of milk if possible, especially with young cows, by feeding meal, bran and roots.

Cattle.—Cows that have not yet calved should be allowed to stand several hours daily in large sunny yards. If the calves be removed from milch cows as soon as dropped, the cow is less worried than if they are taken away after she has become attached to them. New milch cows ought to have roots or some green succulent feed: in winter and early spring what is called “slopes” supplies the place of more natural and better things. April is one of the worst months for caked bag, garget, milk fever, etc.; watch for the first symptoms, and check the disease if possible.

— See that all cattle have access to pure water. Where they drink at a pond, large poles or sticks of timber should keep them from going into the water to stand, as they usually dung immediately after drinking. Do not feed too many animals on the same ground. One good cow, well fed, will yield more milk than two cows on short pasture.

Calves dropped in February will bring large prices in March. If to be raised, wean early, and feed well with skimmed milk, clover tea and gruel.

— Give calves a comfortable yard or pen, whether raised by hand or the cow. Confined in close quarters, the floor beneath should be cleaned often and littered abundantly. It is as cruel as unprofitable to keep them tied in cold, filthy places. Two calves may often be profitably raised on one cow. Always scald or cook meal for young calves before mingling it with any kind of milk or feed, as raw meal is very liable to produce scours. Wheat flour boiled in milk checks scours.

— Keep the yards or pens dry and clean, and mow a little grass for them daily. Where calves are allowed to suck, put a little wheat flour in one end of a small trough and salt in the other end, where calves can reach it. They soon eat meal.

— See that they have a good supply of clean, fresh water during the hot weather. Let them have access also to a tub containing salt,
Wean them gradually. It is very injurious to withhold a full supply of milk abruptly, and confine them to grass and water. It often stunts them, so that they never recover from it.

Beeves.—Bullocks or dry cows should be confined a large proportion of the time in close yards or spacious stalls well littered. Feed with hay, corn meal and some pumpkins or roots. Better feed bountifully and fatten rapidly than to give a small allowance and fatten slowly.

— It is bad policy to sell good cows for beef because they command a high price. Better hold on to good cows for breeding.

— If the weather be pleasant, allow fattening bullocks or dry cows to exercise in a small yard several hours daily. As the warm weather comes on, their thrift will be promoted by carding as often as once a day. As soon as grass is large enough, let them graze about an hour daily; then return them to the yard, but do not diminish the quantity of meal. Beeves will fatten very fast if managed rightly. If meal be discontinued, they will not fatten much till their bowels become accommodated to green feed.

— During April, bullocks three years old should receive from ten to fifteen pounds of fine corn meal, mingled with wet straw during the day. Meal fed at this season of the year will prepare them to lay on fat and flesh when they are turned to grass. This is equally true of fattening sheep designed for early mutton.

— Sheep should not be confined in close stables, but, except during storms, should have the range of a large stockyard or lot. Feed in well-constructed racks and feeding-troughs. Turnips and beets, fed freely, are very fattening, and more economical generally than corn. Whatever grain is fed should be given regularly; even a very small quantity is well, if it can be fed so that each sheep shall get its share. Salt ought to be kept constantly where the sheep can get at it. If, however, it has not been, they must be gradually accustomed to it. Sheep need water in winter. If is much better for them to have access to water which does not freeze.

— Exercise and fresh air are essential to their health. Shelters must be well ventilated, not crowded, and the sheep turned out daily, except in severe storms. Roots, fed with grain, will be returned in wool and mutton. Pregnant ewes should have little, if any, grain, but roots with hay. Those yearling early will need separate, clean, not over-littered apartments, and careful attention, that the lambs be not fatally chilled.

— There is no better feed for young swine, horses, neat cattle of all kinds and sheep than peas and oats. Seed may be obtained by the barrel or sack of seed-dealers in most cities and large towns.
— Keep their yard dry and well littered, and protect them from
cold and wet storms. Sheep dislike wet yards and leaky roofs as
much as a cat does a wet floor.

— Sheep bear more exposure than any other of our domestic
animals (not even excepting horses not worked)—that is, exposure
to the weather, but not without shelter from storms.

— Sheep frequently suffer greatly in August for want of water. If
there is no water in their pasture lot, let them be put at night in a
lot where there is water, or else be driven to water night and morn-
ing; allow them plenty of time to drink. If the weather is wet and
the grass long and succulent, it is a good plan to mow a portion of
it occasionally. The sheep will eat and thrive on the dried grass.
It is a true saying that "sheep like roast meat better than boiled." Lambs
should be weaned in August. Let them have the best of
pasture after weaning, and place the ewes on poor pastures until
dry. Examine the bags for a few days, and, if necessary, draw out
the milk. When dry, and if early lambs are desired next spring,
the ewes toward the latter end of the month should begin to have
abundance of good food. Strong, healthy lambs can only be ex-
pected from ewes in good condition. Sheep intended to be fattened
next winter should be purchased in August and placed in good pas-
ture. In the case of Merinoes select strong, thrifty wethers three or
four years old. There is no money to be made in fattening poor
sheep in winter.

— Separate all feeble ones from the main flock, so that every one
may receive a little grain and roots daily in connection with other
food.

— Sheep, if fed liberally and managed carefully, are most profit-
able stock. The better we do for them, the better they will do for
us; badly managed, they are likely to prove a failure.

— Feeding sheep for market is a profitable business for those who
have judgment to buy well, to feed well and to sell well. Two
profits can easily be made: a big manure heap and good pay for
feed and care will be returned to the skillful feeder.

— Apply a little pine tar to their noses to repel the fly. Separate
bucks from ewes, or fetter their fore legs about five or six inches
apart, that they may be impotent to harm. Designate the age and
character of each sheep by significant marks on the rumps or
shoulders. A figure (1, 2 or 3, etc.) on the shoulder may signify a
ewe and her age, and one on the rump a wether and his age.

— Make timely and suitable preparations for protecting all kinds
of sheep from the cold storms of rain and snow, which are usually
called "May lamb-killers." If sheep have been turned to grass,
they ought to be allowed access to a good shed during most of the time while such storms prevail. Also, to prevent scours, caused by changing from dry feed to grass, let them have only a small quantity of grass daily for several days at the close of the foddering season. Shear early, and without washing.

— A run in a field from which early roots have been gathered will be beneficial to the flock. It will help to accustom them to the change of food which will soon be required. Small or imperfect roots may be left ungathered for them, which they will pick up for themselves. Where early lambs are not desired, the rams should be kept separate from the ewes, or, if it is not convenient, the ram may be aproned or "bratted."

— December is the most important month in the year, in this latitude, to effect anything in improving sheep. Good protection from storms and regular feeding are most important. It is better to commence feeding lambs and all kinds of sheep a little grain daily in December than to wait until they begin to lose flesh.

Lambs.—The ewes should be coupled in October for March lambs. The best ewe is a common-grade Merino or native sheep. For the earliest, those which come from Ohio or Western Pennsylvania, weighing about ninety to one hundred pounds, are excellent for this purpose. A pure South-Down ram, and next a Hampshire-Down, and next a Cotswold, is the best animal to cross upon these. A plump, fat lamb of moderate size will bring more than a "scrawney" one half as big again. The black face and legs of the "Down" breeds are desirable in market lambs.

Oxen.—Feed workers a few quarts of meal every day, whether they labor or not, as it will give them strength, make them endure the heat better, and increase their market value more than the worth of the meal. Provide teamsters with a soft leather lash and limber stock, with which they cannot strike a hard blow.

— Feed in accordance with the labor demanded of them, but on no account let them fall off in flesh. Oxen low in flesh are more liable to meet with accidents than others, and if a poor lousy steer breaks a leg, nobody wants the beef, and it is not fit to eat; not so with one in good condition. Young cattle ought not to be pampered, but well fed and kept in growing order.

Working Oxen.—See that the yokes are right, and bows are not so short as to choke them. Feed working cattle well and handle them carefully, and they will grow fat every day, and be worth more for beef next summer than they may be bought for now. Oxen will endure the heat nearly as well as horses if fed as well and not abused and worried by bad driving. Always allow them at least
two hours during the middle of the day for rest and chewing the cud—time for which is quite as necessary as time to feed.

— Keep them in sheltered sheds, or better in good warm stables, well fed and carded frequently. Poor oxen or young cattle are a disgrace to any farmer. Do not neglect shoeing in freezing weather.

Swine.—The quantity of manure which a few hogs will make, if plenty of muck and litter be thrown from time to time into their pen and the whole be kept under cover, is very great.

— Separate sows that will farrow from other swine. Allow breeding sows, before and after farrowing, potatoes or other succulent food, with bran or linseed meal. At least two weeks before their time for farrowing give them clean, well-littered sties, but not straw enough to endanger the young by overlaying of the mother. A projecting shelf, eight inches high, on the sides of the pen, will allow the pigs to escape much danger from this source.

— Do not feed too high before the young pigs are ten days old.

— Pigs designed for pork next fall should be separated from the sows as soon as they will eat readily. Keep them in moderately close quarters, as, when running about in large enclosures, they will expend a great deal of material without adding proportionately to their growth. There is nothing better than milk, oat and barley meal and wheat flour unbolted to make a pig grow. It is sometimes more economical to feed wheat flour than oat meal to pigs.

— As soon as green peas are fit to feed, let the swine have a good supply. Keep shoats in a thriving condition. When they are confined in close quarters, mow an armful of red clover for them once or twice a day. Where whey is fed, it will make much better swill to mingle meal or shorts with it, and allow fermentation to commence before feeding. Swine of all kinds like clean and pure water, as well as any other animals; and if they could always have access to it, they would not probably "wallow in the mire."

— Keep no pig over a year old for fattening if the most profit is looked for.

— Low prices causes farmer to neglect their pigs. It is poor policy. If kept at all, they should be kept well. Let them search for their food, run on the stubbles, pick up wormy fruit in the orchard, and eat weeds and grass. At night they have a feed of soaked corn, and go to sleep contentedly with a full stomach. They should have constant access to fresh water, and an external application will be gratefully received.

Dogs.—Unite with your neighbors in urging your representatives in the Legislature to protect sheep-raising from the ravages of destructive curs by strong laws.
Dairy.—Look out for improvements in selecting cows for the dairy as well as making butter and cheese. Read *How to Select Cows*. Make a horse, dog or sheep do the churning.

Butter.—Give cows an abundance of sweet grass and clean water, and access to salt; see that boys and dogs do not worry them; milk regularly with clean hands; keep milk in clean and sweet vessels, and in a cool, pure apartment; churn often; work the butter well with anything but the bare hands; use only the purest and best salt; pack in clean jars or tubs; keep cool, and cover with salt cloths, and the butter will be equal to prime "Orange County."

Poultry.—To gratify the secretiveness of hens make nests where they cannot be seen by other fowls when they are laying or setting. If nests be too deep, eggs will rest on each other, which should never occur.

— Confine as soon as the garden is sown, or keep them out of it. Put hens (in coops) and young chickens in the garden. Turkeys’ eggs ought not to be set before the first of May; when hatched, put the brood in a dry, warm shed, where no other poultry have been in the habit of frequenting, and keep them out of dewy grass for six weeks.

— Keep a good dust-bath for the fowls, and add unleached wood-ashes to it occasionally; watch any appearance of vermin, and clear them out with an application of kerosene, which may be rubbed under the wings and on the backs and breasts of the birds. White-wash occasionally and thoroughly houses, perches, nests and all.

— Collect eggs of all kinds before evening, lest they be injured during cold nights. Place those designed for setting in a pan of bran or oats, little end down, to keep the yolk from the side and adhering to the shell. Hens and other female birds turn over their eggs frequently, both before and during the period of their incubation. Mark choice eggs with red chalk or pencil.

— Why do so many eggs sold in the markets taste so strongly of straw? Because the farmers permit their fowls to work most of their living out of the manure-heap. This not only gives the egg a peculiar taste, but the flesh also. Just feed a hen on onions or turnips for a few days; kill it, and you will be convinced of the effect of the food on the egg and meat, if you have any doubt on the subject. Give your fowls plenty of sound grain and clean food, and keep the manure for the soil.

— Feed well; let them out of the yard before sunset daily; supply them with a box of sharp gravel where there is none in the soil. Whole grain should be soaked at least twenty hours for them; and if ground it will go much further.
— If eggs are expected during the winter, they must be provided for in October. Dispose of the old hens; select as many of the best young pullets, and feed them well. Give wheat soaked in hot water once a day. Barley, buckwheat and corn, in equal proportions, may make the rest of the food; chopped cabbages will help. Provide clean quarters, plenty of water, gravel, old mortar and charcoal. Make the house warm; do not crowd too many into it, and a good supply of eggs will result.

— Insist on having eggs. Warm, clean quarters, cooked grain and potatoes, scraps of meat, powdered bones or lime, gravel, ashes and warm water, are the convincing arguments.

— Feed scraps of meat or pounded bones frequently in winter. Give warm, light quarters, and dry ashes to dust themselves with, fresh water (but warm) daily, and keep the water and feed vessels scrupulously clean. Thus avoid diseases among poultry, and get plenty of eggs.

— Fill a box before the snow covers the ground with a bushel or two of clean gravel; but if this cannot be found, pound up some large stones—best sandstones.

Care of Poultry.—Roup.—If hens seem to have cold in the head, what is the matter, and how can I cure them?

It is roup. Remove the dry discharge from the eyes and nose, and wash them morning and evening with water and vinegar, about half and half.

Pip.—What will cure pip in hens?

Pip is caused by exposure to damp or wet weather. The symptoms are a short, quick, spasmodic cough resembling a chirp, with a stoppage of the nostrils, compelling the fowl to respire through the mouth. It is not considered a disease in itself, but is a symptom, and if not attended to and checked will result in catarrh, and oftentimes end in roup. Remove the bird to a dry, warm place, wash out the mouth and nostrils with a weak solution of chlorinated soda, and mix cayenne pepper with the food.

A Cure for Chicken Cholera.—One of the greatest afflictions in the poultry-yard is chicken cholera, and when once the disease gets a foothold, unless some prompt measures are taken to prevent its spread, the consequences are often disastrous. The following is a specific for this disease:

Cayenne pepper, 2 parts, | Pulverized gentian, 1 part,
Prepared chalk, 2 parts, | Pulverized charcoal, 1 part.

Take the parts by measurement, not by weight. Mix all with lard or mutton suet to a consistency suitable to be made into pills, and
make them about the size of a common marble. To fowls afflicted with cholera or roup give each one pill twice a day, and keep them in a warm, dry place. In forty-eight hours a cure will be effected. As a preventive when cholera prevails in the neighborhood, one pill once a week may be given to each fowl. With this recipe sixteen out of seventeen chickens attacked with cholera can be cured.

Miscellaneous.—Accounts.—No farmer is true to his own interests who does not keep accurate accounts of his business. It is not so easy as where everything has a definite money-value, but after a little practice we may soon get in the way of placing a just value on the labor of men and animals, our own time, etc. One of the most important things is a correct inventory of everything that has value—of investments and stock in trade; of debts and dues; of livestock and implements; of manures in the ground and in the compost heap, etc. etc. A good inventory once a year is an invaluable aid in regulating future management. Devote sufficient time to a thorough going over of all accounts, and begin the new year with a clear statement of your debts and dues.

Advertisements are profitable reading. They usually indicate what progress the world is making. To farmers they are invaluable. Notes on tools, seeds, stock, trees, plants, etc. should be made, and further information gained by sending for circulars of trustworthy parties.

Animals.—Let roots be fed at least in small quantities wherever practicable. Use the card and brush freely on horses and neat stock, and see to it that the active fermentation which the warm weather will cause in the manure does not affect the stock unfavorably. Mares, cows, ewes and sows are all liable to slink their young unless they receive constant care—not once a week, but several times a day. It is unnatural for animals to bring forth prematurely, and the reason for their doing so is often plain. Sometimes it is caused by lack of sufficient nourishment, water and feed; sometimes by ergot, and perhaps smut or poisonous fungi in the hay; sometimes by over-exertion, by slipping down, or by some act of violence, such as a kick in the flank with a big boot, a severe hooking or worrying or something else. Mares and cows frequently slink their young in April for want of water, and sometimes from being compelled to drink impure water, especially that impregnated with manure, either upon the surface or from wells in the barnyard into which the leachings run. Feed whole grain to no animals except sheep having good teeth. As the warm weather comes on, and animals begin to shed their hair, they will consume as much feed as in winter, if it be good. The change of feed from
green to dry should be gradual with all stock; otherwise the appetite may fail and the animals lose thereby.

_Ashes_ fresh from the fire should not be emptied into wooden smoke-houses. A few smouldering sparks may be sufficient to fire the structure, destroy its contents and cause great loss; at least the lower part should be brick or stone.

— Leached or unleached wood or coal ashes (if free from slate and clinker) are excellent for top-dressing lawns, meadows and pastures; and the more they are scattered around fruit trees of all kinds, the better will be the fruit. Instead of collecting them in heaps, scatter where they are needed as soon as convenient quantities accumulate. Ashes heaped up against young trees will often destroy the bark and kill them.

_Bags, Barrels, Baskets, etc._, used for marketing or kept at home, should be plainly marked with the owner's name and residence. A branding-iron or marking-plate and brush will save much loss. Improve leisure by putting all in repair.

_Birds._—Spare the birds, for they are great benefactors to farmers and gardeners. Do nothing to frighten them from your grounds.

— Prepare neat houses for martins, bluebirds and wrens, to be put up about the house, fruit-yard and farm. The occupants next season will pay good rent by destroying multitudes of insects, and sing grateful thanks.

— For wrens, boxes 4×4, with an inch hole for entrance two inches above the floor; for bluebirds, 6×6, with 1¼-inch hole. Colonize the different birds in separate places, for the wrens are quarrelsome.

_Debs._—Lift mortgages rather than buy carriages or other non-essentials. A pinching time will come.

_Eaves-Troughs._—Before freezing weather remove leaves and all other sediment which settle in the eaves-troughs. When cistern water is not used for drink, for culinary purposes or for stock, it is a good plan to paint the troughs over with gas or coal tar, applied hot after boiling it an hour; it is a good preservative.

_Farmers' Clubs._—Hold frequent meetings. Discuss the farming of your own neighborhood, and how it may be improved. Find out who has got the best seeds of various kinds, and secure the advantage for the club. Make observations on the care of stock, and see whose are wintered the best and most conveniently.

— The meetings may be made interesting by committees appointed to investigate and report on various subjects, as new crops proposed, new implements, the condition of farms in the vicinity,
MISCELLANEOUS.

etc.; by correspondence with other similar associations, and occasional joint meetings of the clubs of a township.

Food for cattle and hogs will be improved and economized by steaming. A good apparatus especially for this purpose will pay where many animals are kept, A large kettle will do.

Harness and Carriage-Tops.—Keep clean, and, after they have been wet, oil them thoroughly.

Hoove.—Watch all animals that feed on red clover, and prevent this dangerous disease, which comes from over-feeding.

Ice.—The earlier ice is secured, the better. If well put in in the coldest weather, it is a good job out of the way. Use clear, good ice only.

— In good weather an ice-house may be made and filled within a week. One will pay on a dairy farm, and be convenient everywhere.

Markets.—Hold no produce after a good price is offered. Grain shrinks, heats or is destroyed by vermin very often, and beeves and sheep, after they are fit for market, are seldom kept with profit more than a few weeks at most.

Maple Sugar.—The high price of sugar should stimulate the largest possible production. The first flow of sap is the richest; make preparation to secure it during the open weather, which often occurs in February,

Racks.—As soon as the foddering season is over, remove the feeding-racks from the yard to some place where they will not be damaged during summer. Stored under shelter, they will last years.

Rats.—The damage by rats is one of the most serious losses to which farmers are subjected. On the whole, this loss is doubtless greater than that from all the fires which occur upon farms. A preparation called "Poisoned Wheat," put up for the purpose of destroying vermin, is very effective. But poison of any kind should be used so that fowls or other animals cannot get it. To destroy the rats is a timely work, and will prevent much loss of grain.

Sundry Matters.—Harvesting machinery should be cleaned and stored away. The bright parts may be kept from rusting by coating them with paraffine or tallow. One of the best preparations to protect iron or steel from rust is made by melting a pound of fresh (not salt) lard with a piece of rosin the size of a hen’s egg—the exact proportion not important. Melt the two together, and stir as it cools; keep secure from dust, and use it on all parts of machinery liable to injury by rust.... The bearings should be well wiped and oiled with castor-oil. All dust should be removed, and with
costly machinery it will pay to provide a sheet or blanket to cover it with as a protection from dust. Where swamp-muck is to be dug, it is best to give the work by contract. A good man can make fair wages at fifteen cents a cubic yard; if the workman is not a good one, he cannot expect higher pay on that account. Muck should be dug before cold weather comes, as it is disagreeable work when the ground is full of cold water. Hay that is stacked should be hauled in, or the stack should be protected on the top by extra covering. Coarse herbage or weeds not in seed may be cut and hauled into the barnyard, and spread to form a basis for a deep coating of manure and an absorbent for moisture. An abundance of litter will soak up the water and prevent the drainage which so often flows from yards and accumulates in foul pools.

_Sunshine._—Every animal should have the benefit of the sunshine as well as light. Such as have been kept in close quarters all winter should be allowed to go out and bask in the sunshine every day. Sunshine in the spring is a great luxury for all kinds of animals, and promotes their health and thrift.

—Young stock need not be housed until real cold weather sets in, but they should have a warm shed to lie in at night, and be kept in first-rate condition.

_Seed._—Look out in advance for good fresh seeds of all kinds. Try all that are the least doubtful in pots or boxes of earth, carefully attended, and neither too wet nor too dry. Never keep seeds in air-tight or very close vessels.

_Timber Land._—Clean the wood-lots of crooked, broken or hollow trees, and secure fire-wood in this way, and do it at the present season.

_Trees._—As soon as the frost is out of the ground ornamental trees may be transplanted, and if the soil is in order fruit trees also. Drain the soil thoroughly, and pulverize deeply for all kinds of trees and shrubbery; manure will usually be needed.

_Ventilators._—Make one or two near the middle of every stack and mow by tacking four boards about one foot wide together, making a trunk; set these on end, and draw them upward as the mow or stack is carried up. Some holes should be bored through the floor where the ventilator stands, to let in the air. A bag stuffed with hay answers a similar purpose to the trunk or boards, but of course may not be left in the top of the hole, as the trunk may, when the mow is full.

_Water._—It is a great mistake to stint animals in water; seventy-five per cent. of their weight is water. Digestion cannot go on without it. Water is therefore food in one sense, and an ample supply should be provided for every animal to drink when inclined.
— See that water does not stand on winter grain nor for a long time on grass ground. A few hours' work with spade and shovel will often release numerous small ponds which would materially injure vegetation. Surface water frequently settles and remains a long time in low places near fruit trees, vines or bushes, to their great injury.

— Look carefully over the farm when there is a great amount of surface water, and see that it does not run across recently plowed fields and wash away the soil. Turn small streams of muddy water from highways upon meadows and pastures; they carry with them much fertilizing matter, and will increase the crop of grass for years.

**Wood.**—Begin early to look out for the season's supply from the wood-lot. It is poor economy to burn green wood; better to let it stand in a hot place or lie in the stove oven to dry well. Water put upon the fire only tends to put it out.

— Improve every stormy and leisure day in preparing fire-wood. Split and pile whatever fire-wood is exposed to the weather, so that it may dry out before it becomes water-soaked. Fire-wood should have the benefit of the hot weather in July and August. Save many late dinners and much needless scolding and annoyance in the household by having a year's stock cut and stored under cover.

**Wool.**—Keep the floor clean while shearing; tie it up neatly; arrange the fleeces to show advantageously, and keep it in a clean apartment where mice or rats will not carry chaff and straw among it.

**Work.**—Drive your work in the cool parts of the day. From four o'clock to seven in the morning—the very time when most farmers do the least work—is the pleasantest time to labor. Rest from 11 to 1 o'clock. Then work will go much easier than to rest during the cool part of the day.

**Rainy-day work** is painting and cleaning of tools, oiling and mending of harness, cutting kindling-wood, and such like jobs common upon every farm.

**Wagons.**—Keep them well protected from rains and sunshine, as the continued influence of these injures vehicles more than the ordinary use. Rain will hurt them but little if they are kept in the shade. A liberal coat of linseed oil on the wheels will often save dollars for resetting the tire.

One acre well cultivated is more profitable than two which receive only the labor and attention that should be given to one. One sheep or cow well fed is more profitable than two fed on the amount necessary to keep but one well.
CALENDAR FOR THE FLOWER, FRUIT AND VEGETABLE GARDEN.

(Chiefly for the Northern States.)

JANUARY.

Flower Garden.—Hyacinths and other bulbs that have been kept in a cellar or other dark, cool place may now be brought into the light of the sitting-room, provided they have filled the pots with roots. If they are not well rooted, leave them until they are, or select such of them as are best, leaving the others. In the outside flower garden little can be done, except that shrubs may be pruned, or new work, such as making walks or grading, performed, if weather permits.

Fruit Garden.—Pruning, staking up or mulching can be done if the weather is such that the workmen can stand out. No plant is injured by being pruned in cold weather.

Vegetable Garden.—But little can be done in the Northern States except to prepare manure and get sashes, tools, etc. in working order; but in sections of the country where there is little or no frost the hardier kinds of seeds and plants may be sown and planted, such as asparagus, cabbage, cauliflower, carrot, leek, lettuce, onion, parsnip, pea, spinach, turnip, etc. In any section where these seeds can be sown in open ground it is an indication that hot-beds may be started for the sowing of such tender vegetables as tomatoes, egg and pepper plants, etc., though, unless in the extreme Southern States, hot-beds should not be started before the beginning or middle of February.

FEBRUARY.

Flower Garden.—The directions for January will in the main apply to this month, except that now some of the hardier annuals may be sown in hot-beds, and also the propagation of plants by cuttings may be done rather better now than in January, as the greater amount of light gives more vitality to the cutting.

Fruit Garden.—But little can be done in most of the Northern States as yet, and in sections where there is no frost in the ground it is likely to be too wet to work; but in many Southern States this will be the best month for planting fruit trees and plants of all kinds, particularly strawberries, raspberries, blackberries, pear and apple trees, while grapevines will do, though they will also do well quite a month later.

Vegetable Garden.—Leaves from the woods, house manure or refuse hops from breweries may be got together toward the latter part of this month, and mixed and turned to get "sweetened" preparatory to forming hot-beds. Cabbage, lettuce and cauliflower seeds, if sown early this month in hot-bed or greenhouse, will make fine plants if transplanted into hot-bed in March. This is preferable to the use of fall-sown plants. Manure that is to be used for the crop should be broken up as fine as possible, for the more completely manure of any kind can be mixed with the soil the better the crop will be, and, of course, if it is dug or plowed in in large, unbroken lumps it cannot be properly commingled.

MARCH.

Flower Garden.—Hardier kinds of annuals may be sown; it is best done in shallow boxes, say two inches deep. Lawns can be raked off and mulched
with short manure, or rich garden earth where manure cannot be obtained. Flower beds on light soils may be dug up so as to forward the work of the coming busy spring season.

_Fruit Garden._—In many sections planting may now be done with safety, provided the soil is light and dry, but not otherwise. Again, at this season, although a tree or plant will receive no injury when its roots are undisturbed in the soil, should a frost come after planting the same amount of freezing will, and very often does, greatly injure the plant if the roots are exposed.

_Vegetable Garden._—This is a busy month. In localities where the frost is out of the ground, if it is not wet, seeds of the hardier vegetables can be sown. The list of seeds given for the Southern States in January may now be used at the North, while for most of the Southern States tender vegetables, such as egg-plant, okra, sweet potatoes, melons, squash, potatoes, tomatoes, etc., may be sown and planted. Hot-beds must now be all started.

**April.**

_Flower Garden._—Window plants require more water and ventilation. Due attention must be paid to shifting well-rooted plants into larger pots, and, if space is desired, many kinds of hardier plants can be safely put out in cold frames. All herbaceous plants and hardy shrubs may be planted in the garden. The covering of leaves or litter should be taken off bulbs and tender plants that were covered up for winter, so that the beds can be lightly forked and raked. Sow tender annual flower-seeds in boxes inside.

_Fruit Garden._—Strawberries that have been covered up with straw or leaves should be relieved around the plants, leaving the covering between them. Raspberries, grapevines, etc. that have been laid down, may now be uncovered and tied up to stakes or trellises, and all new plantations of these and other fruits may now be made.

_Vegetable Garden._—Asparagus, rhubarb, spinach, etc. should be uncovered, and the beds hoed or dug lightly. Hardier sorts of vegetable seeds and plants, such as beets, cabbage, cauliflower, celery, lettuce, onions, parsley, parsnip, peas, potatoes, radishes, spinach, turnip, etc., should all be sown or planted by the middle of the month if the soil is dry and warm, and in all cases, where practicable, before the end of the month. It is essential, in sowing seeds now, that they be well firmed in the soil. Any who expect to get early cabbage, cauliflower, lettuce or radishes, while planting or sowing is delayed until the time of sowing tomato and egg-plant in May, are sure to be disappointed of a full crop.

**May.**

_Flower Garden._—Window plants should be in their finest bloom. By the end of the month all of the plants that are wanted for the summer decoration of the flower border may be planted out, first loosening a little the ball of earth at the roots. If the weather is dry, water freely after planting. Flower beds should be kept well hoed and raked, to prevent the growth of weeds next month. Lawns should be mown and the edgings trimmed. Pelargoniums, pinks, monthly roses and all the half-hardy kinds of flowering plants should be planted early; but coleus, heliotrope and the more tender plants should be delayed until the end of the month. Annuals that have been sown in the greenhouse or hot-bed may be planted
out, and seeds of such sorts as mignonette, sweet alyssum, phlox Drummondii, portulaca, etc. may be sown in the beds or borders.

Fruit Garden.—The hay or leaf mulching on the strawberry beds should be removed and the ground deeply hoed, after which it may be placed on again to keep the fruit clean and the ground from drying. Where it has not been convenient before, most of the smaller fruits may yet be planted during the first part of the month. Tobacco-dust will dislodge most of the numerous kinds of slugs, caterpillars or worms that make their appearance on the young shoots of vines or trees.

Vegetable Garden.—Attention should be given to new sowings and plantings for succession. Crops sown last month will have to be thinned out if large enough. Hoe deeply all transplanted crops, such as cabbage, cauliflower, lettuce, etc. Tender vegetables, such as tomatoes, egg and pepper plants, sweet potatoes, etc., can be planted out. Seeds of Lima beans, sweet corn, melon, okra, cucumbers, etc. should be sown, and sow for succession peas, spinach, lettuce, beans, radishes, etc. every ten days.

JUNE.

Flower Garden.—Hyacinths, tulips and other spring bulbs may be dug up, dried and placed away for next fall’s planting, and their places filled with bedding plants, such as coleus, achyranthes, pelargoniums and the various white and colored leaf-plants. It will be necessary to mow the lawn once a week.

Fruit Garden.—The small fruits should be mulched about the roots, if this has not yet been done. Grapevines outside as well as in should be disbudded.

Vegetable Garden.—Beets, beans, carrots, corn, cucumbers, lettuce, peas and radishes may be sown for succession. This is usually a busy month, as many crops have to be gathered, and, if hoeing is not promptly seen to, weeds are certain to give great trouble. Tomatoes should be tied up to trellises or stakes if fine flavored and handsome fruit is desired, for if left to ripen on the ground they are apt to have a gross, earthy flavor.

JULY.

Flower Garden.—All plants that require staking, such as dahlias, roses, gladioli and many herbaceous plants, should now be looked to. Carnations and other plants that are throwing up flower stems, if wanted to flower in winter, should be cut back; that is, the flower stems should be cut off to say five inches from the ground.

Fruit Garden.—If grapevines show any signs of mildew, dust them over with dry sulphur, selecting a still, warm day. The fruit having now been gathered from strawberry plants, if new beds are to be formed, the system of layering the plants in small pots is the best. Where apples, pears, peaches, grapes, etc. have set fruit thickly, thin out at least one-half to two-thirds of the young fruit.

Vegetable Garden.—The first ten days of this month will yet be time enough to sow sweet corn, beets, lettuce, beans, cucumbers and rutabaga turnips. Such vegetables as cabbage, cauliflower, celery, etc., wanted for fall or winter use, are best planted this month, though in some sections they will do later. Keep sweet potatoes hoed to prevent the vines rooting at the joints.
FLOWER, FRUIT AND VEGETABLE GARDEN.

AUGUST.

Flower Garden.—But little deviation is required from the instructions for July.

Fruit Garden.—Strawberries that have fruited will now be making "runners" or young plants. These should be kept cut off close to the old plant, so that the full force of the root is expended in making the "crows" or fruit-buds for next season's crop. If plants are required for new beds, only the required number should be allowed to grow, and these should be layered in pots, as recommended in July. The old stems of raspberries and blackberries that have borne fruit should be cut away, and the young shoots thinned to three or four canes to each hill or plant. If tied to stakes and topped when four or five feet high, they will form three or four branches on a cane, and will make stronger fruiting plants for next year.

Vegetable Garden.—Hoe deeply such crops as cabbage, cauliflower and celery. The earthing up of celery this month is not to be recommended. Onions in many sections can be harvested. The proper condition is when the tops are turning yellow and falling down. They are dried best by placing them in a dry shed in thin layers. Sow spinach for fall use, but not yet for the winter crop. Red top, white globe and yellow Aberdeen turnips should now be sown; rutabaga turnips sown last month will need thinning, and in extreme Southern States they may yet be sown.

SEPTEMBER.

Flower Garden.—The flower-beds in the lawn should be at their best. If planted in "ribbon lines" or "massing," strict attention must be given to pinching off the tops, so that the lines or masses will present an even surface. Tender plants will require to be put in the house toward the end of this month; but be careful to keep them as cool as possible during the day. Cuttings of bedding plants may now be made freely if wanted for next season, as young cuttings rooted in the fall make better plants for next spring's use than old plants in the case of such soft-wooded plants as pelargoniums, fuchsias, verbenas, heliotropes, etc.; with roses and plants of a woody nature, however, the old plants usually do best. Dutch bulbs, such as hyacinths, tulips, crocus, etc., and most of the varieties of lilies, may be planted. Violets that are wanted for winter flowering will now be growing freely, and the runners should be trimmed off. Sow seeds of sweet alyssum, candytuft, daisies, mignonette, pansies, etc.

Fruit Garden.—Strawberry-plants that have been layered in pots may yet be planted, or in Southern districts the ordinary ground layers can be planted. The sooner in the month both are planted the better crop they will give next season; and, as these plants soon make runners, it will be necessary to trim them off. Attend to raspberries and blackberries as advised for last month, if they have not already been attended to.

Vegetable Garden.—If cabbage, cauliflower and lettuce are wanted to plant in cold frames, the seed should be sown from about the tenth to the twentieth of this month; but judgment should be exercised, for, if sown too early, cabbage and cauliflower are apt to run to seed. The best date for latitude of New York is September 15th. The main crop of spinach or sprouts that is wanted for winter or spring use should be sown about the same date. The earth should be drawn up to celery with a hoe preparatory to earthing up with a spade. Onions that were not harvested and dried last month must now be attended to. Turnips of the early
FLOWER, FRUIT AND VEGETABLE GARDEN.

or flat sorts may yet be sown the first week of this month in the Northern States, and in the South from two to four weeks later.

OCTOBER.

Flower Garden.—In northern sections of the United States tender plants that are still outside should be got under cover as early as possible. Delay using fire heat as long as possible, unless the nights become so cold as to chill the plants inside the house. Fall bulbs of all kinds may be planted. Take up summer-flowering bulbs and tubers, such as dahlias, tuberoses, gladioli, cannas, caladiums, tigridias, and dry them off thoroughly, stowing them away afterward in some place free from frost and moisture during winter.

Fruit Garden.—Strawberries that have been grown from pot-grown layers may yet be planted in Southern States; keep the runners trimmed off. Fruit trees and shrubs may be set out; but if planting is deferred to the last of the month, the ground around the roots should be mulched to the thickness of three or four inches with straw, leaves or rough manure as a protection against frost.

Vegetable Garden.—Celery will now be in full growth, and will require close attention to earthing up, and during the last part of the month the first lot may be stored away in trenches for winter. All vegetable roots not designed to be left in the ground during the winter should be dug up, such as beets, carrots, parsnips, sweet potatoes, etc. The cabbage, cauliflower and lettuce plants grown from seed sown last month should be pricked out in cold frames. If lettuce is wanted for winter use, it may now be planted in the cold frame, and will be ready for use about Christmas. If asparagus or rhubarb is wanted for winter use, it should be taken up and stowed away in pit, frame, shed or cellar for a month or two. It may then be taken into the greenhouse and packed closely together under the stage, and will be fit for use from January to March, according to the temperature of the house.

NOVEMBER.

Flower Garden.—Plants intended to be grown inside should now all be indoors. Keep a sharp lookout for cold snaps, as they come very unexpectedly in November, and many plants are lost thereby. In cases where it is not convenient to use fire heat, 5° to 10° of cold can be resisted by covering the plants over with paper, and by using this before frost has struck the plants valuable collections may be saved. Little can be done in the flower garden, except to clean off all dead stalks and straw up tender roses, vines, etc., and, wherever there is time to dig up and rake the borders, as it will greatly facilitate spring work. Cover up all beds in which there are hyacinths, tulips and other bulbs with a litter of leaves or straw to the depth of two or three inches. If short, thoroughly decayed manure can be spared, a good sprinkling spread over the lawn will help it to a finer growth next spring.

Fruit Garden.—Strawberry beds should be covered (in cold sections) with hay, straw or leaf mulching to a depth not exceeding two inches. Fruit trees and grapevines generally should be pruned; and, if the wood of the vine is wanted for cuttings, or scions of fruit trees for grafts, they should be tied in small bundles and buried in the ground until spring.

Vegetable Garden.—Celery that is to be stored for winter use should be put away before the end of the month in all sections north of Virginia;
south of that it may be left in most places where grown throughout the winter, if well covered up. The stalks of the asparagus bed should be cut off, and burned if there are berries on them, as the seed scattered in the soil sometimes produces troublesome weeds. Mulch the beds with two or three inches of rough manure. All vegetable roots that are yet in the ground, and not designed to be left there over winter, must be dug up in this latitude before the middle of the month, or they may be frozen in. Cover up onions, spinach, sprouts, cabbage or lettuce plants with a covering of two or three inches of leaves, hay or straw to protect them during the winter. Cabbages that have headed may usually be preserved against injury by frost until the middle of next month by simply pulling them up and packing them closely in a dry spot in the open field with the heads down and roots up. On approach of cold weather in December they should be covered up with leaves as high as the tops of the roots, or, if the soil is light, it may be thrown over them if leaves are not convenient. Cabbages will keep this way until March if the covering has not been put on too early. Plow all empty ground if practicable, and, whenever time will permit, do trenching and subsoiling. Cabbage, cauliflower and lettuce plants that are in frames should be regularly ventilated by lifting the sash on warm days, and on the approach of very cold weather they should be covered with straw mats or shutters. In the colder latitudes, and even in the Middle States, it is absolutely necessary to protect cauliflower in this way, as it is much more tender than cabbage and lettuce plants.

December.

*Flower Garden.*—Close attention must be paid to protecting all tender plants, for it is not uncommon to have the care of a whole year spoiled by one night's neglect. Vigilance and extra hot fires will have to be kept up when the thermometer falls to 34° or 35° in the parlor or conservatory. If they are in the parlor, move them away from the cold point and protect them with paper; this will usually save them even if the thermometer falls to 24° or 26°. With plants outside that require straining up or to be mulched, this will have now to be finished.

*Fruit Garden.*—In sections where it is an advantage to protect grape-vines, raspberries, etc. from severe frost, these should be laid down as close to the ground as possible, and covered with leaves, straw or hay, or with a few inches of soil.

*Vegetable Garden.*—Celery in trenches should receive the final covering for the winter, which is best done by leaves or light stable litter; in the latitude of New York it should not be less than twelve inches thick. Potatoes, beets, turnips or other roots in pits, the spinach crop in the ground, or any other article in need of protection, should be attended to before the end of the month; manure and compost heaps should be forwarded as rapidly as possible, and turned and mixed, so as to be in proper condition for spring. Remove the snow that accumulates on cold frames or other glass structures, particularly if the soil which the glass covers was not frozen before the snow fell; it may remain on the sashes longer if the plants are frozen in, since they are dormant, and would not be injured if deprived of light for eight or ten days. If roots have been placed in cellars, attention must be given to ventilation, which can be done by making a wooden box, say six by eight inches, to run from the ceiling of the cellar to the eaves of the building above.
Cheap Wash for Buildings.—Take a clean, water-tight cask and put into it half a bushel of lime. Slack it by pouring water over it boiling hot, and in sufficient quantity to cover it five inches deep, and stir it briskly until it is thoroughly slackened. When the lime has been slackened, dissolve it in water, and add two pounds of sulphate of zinc and one of common salt. These will cause the wash to harden and prevent its cracking, which gives an unseemly appearance to the work. A beautiful cream-color may be given to the wash by adding three pounds of yellow ochre, or a good pearl- or lead-color by the addition of a lump of iron-black. For fawn-color add four pounds of umber, one pound of Indian red and one pound of common lampblack. For stone-color add two pounds of raw umber and two pounds of lampblack. When applied to the outside of houses and to fences, it is rendered more durable by adding about a pint of sweet milk to a gallon of wash.

Whitewash.—Take half a bushel of unslacked lime, and slack it with boiling water. Cover it during the process. Strain it and add a peck of salt dissolved in warm water, three pounds of ground rice boiled to a thin paste put in boiling hot, half a pound of Spanish whiting and a pound of clean glue dissolved in warm water. Mix it and let it stand several days. Keep it in a kettle, and put it on hot as possible with a brush. It is said to look as well and last nearly as long as oil paint on wood, brick or stone.

—A very simple wash may be made in the following manner: Slack as above, and add to each pailful half a pint of salt and the same quantity of wood-ashes sifted fine; this makes it thick like cream, and covers smoke much better. Use hot. Coloring may be used if desired.

Cheap Paint, for painting on or about mills; excellent and cheap, and will last much longer than any ordinary whitewash: Three hundred parts of washed and sieved white sand, forty parts of precipitated chalk, fifty parts of resin and four parts of linseed oil are mixed and boiled in an iron kettle, and then one part of oxide of copper and one part of sulphuric acid are added. This mass is applied with an ordinary paint-brush while warm. If it is too thick it is diluted with linseed oil. This paint dries very rapidly and gets very hard, but protects the wood excellently.

Filter.—A tight brick box, of a capacity of eight or ten quarts, built in the bottom of a cistern, enclosing the end of the pump-pipe, cannot be exhausted, and will act as a perfect filter. It may appear strange to those who have not seen it, but it is a fact that the water will pass through the bricks as fast as it can be pumped out.

Fixing Shingles.—Oiling or painting shingle roofs at the time of laying the shingles pays. Dipping the butts into hot whitewash is also recommended as the shingles are laid. There can be no doubt of the economy of thus protecting roofs from decay, either by painting, oiling or whitewashing.

Cheap Snow-plow.—Take two boards from twelve to fifteen inches wide and four feet long; nail the two ends together, and spread the other ends thirty inches apart, making them the shape of a V; confine them in
place with boards nailed across the top, and by a board across the end four or five inches narrower than the sides, so if the path is not perfectly smooth it will not catch the stones; near the front end an iron bolt should be placed across to hitch the horse to; on the top should be fastened a box for the driver to sit on, and the plow is complete. The labor is so simple and the cost so small that there is no excuse for a farmer being without a snow-plow.

Cement.—Cement of one part sand, two parts ashes and three parts clay, mixed with oil, makes a very hard and durable substance like stone, and resists the weather almost like marble.

Concrete.—For making floors, four parts coarse gravel or broken stone and sand, and one part each of lime and cement, are mixed in a shallow box and well shovelled over from end to end. The sand, gravel and cement are mixed together dry. The lime is slacked separately, and mixed with just mortar enough to cement it well together. Six or eight inches of the mixture are then put on the bottom, and when well set another coating is put on, consisting of one part cement and two of sand. This will answer for making the bottom of a cistern that is to be cemented up directly upon the ground without a lining of bricks. This will also form a very good cellar-floor.

How to Make Cisterns.—Many farmers who have never experienced the advantages of barn cisterns would avail themselves of them if they knew with how little cost and trouble they can be built. In ordinary clay soils a cistern may be built without brick—except for the arch—by merely making the excavation of the size and depth required, and laying the mortar immediately on the clay sides; if well done with good hydraulic cement and clean coarse sand, it will be as permanent as if plastered upon a brick wall.

Rat-proof House.—About sixteen years ago I built a brick stable, the floor of which was formed by laying sleepers for it at suitable distances apart, flat on the ground, and then filling up between them with cement to a level of their face, and before it dried in the least nailing hemlock plank firmly to them. No rat or mouse has ever been able to dig or gnaw a hole through this floor.

Repairing Roofs.—Procure coal-tar at the gasworks, and mix finely-sifted coal-ashes or road-dust with it till about as thick as mortar. Plaster with this carefully around leaky roof-valleys or gutters or about chimney-flushings. It will soon set as hard as stone, and apparently as indestructible. This preparation is very cheap, and would probably answer equally well spread all over a roof previously laid with felt or roofing paper. Once put on properly, it would seem to be there for all time.

Egg-Preserver.—Take eight pounds of salt, five pounds fresh lime, one-half pound saltpetre, one-half pound alum, one-half pound charcoal, six ounces gum arabic, four ounces copperas and twenty-two gallons of water. This will be enough for a barrel or other vessel holding forty-four gallons. The charcoal should be broken into very small pieces, and put into a muslin or common thin cotton cloth sack, and fastened to the side or bottom of the vessel in which the eggs are to be put. Put the lime and salt in some convenient vessel, and pour in the water; pulverize the alum, saltpetre, copperas and gum arabic, and add to the water. Stir well until all is dissolved, and then let the whole stand twenty-four hours before using. When using barrels the preserver can be mixed right in the barrel itself.
Of course larger or smaller proportions of the ingredients may be used in accordance with the quantity of preserver you wish to make. The above quantity is sufficient for about one hundred and fifteen to one hundred and twenty dozen eggs. New barrels are best, and if you use second-hand ones be sure that they are perfectly clean and sweet. Vessels in which kerosene, coal oil, carbon oil, camphene, patent oils, flaxseed, vinegar or cider have been kept cannot be used at all. Vessels in which whiskey, lard or molasses have been kept, and barrels in which meat has been salted, will answer very well, but need cleansing and purifying before being used. Be careful and pack none but perfectly fresh, sound eggs, and keep the vessel containing them in a cool cellar or very cool place in the summer, and where they will not freeze in the winter. It facilitates the packing to use a basket containing several dozen eggs; sink it in the liquid and turn the eggs out carefully. If any swim, they are bad and must be rejected. When ready for shipment take them out with a skimmer, drain off in baskets until perfectly dry, so that chaff will not stick to them, and pack in dry oats for shipment. The preserver should cover the eggs to a depth of two or three inches, and the vessel be covered to keep the dust out. In two or three days after packing a thin artificial shell forms on top of the preserver, which it is well to leave unbroken as long as possible, although no particular harm will ensue from disturbing it to remove a part of the eggs if desired. Ground alum is preferable to the salt.

Oiling Harness Leather.—Oils, when applied to dry leather, invariably injure it, and if to leather containing too much water, the oil cannot enter. Wet the harness over night, cover it with a blanket, and in the morning it will be damp and supple; then apply neatsfoot oil in small quantities, and with as much elbow-grease as will ensure its disseminating itself through the leather. A soft, pliant harness is easy to handle, and lasts longer than a neglected one. Never use vegetable oils on leather, and among the animal oils neatsfoot is the best.

Remedy for Sprains.—Oil stone, one ounce; oil spike, one ounce; oil seneca, one ounce; spirits camphor, one-half ounce. Mix well and rub the part sprained well with liniment. Pour some on a piece of flannel and wrap it carefully around the sprain. It has been thoroughly tested, and is a sure cure for all sprains of the ankle, wrist or any like place. Is also good for horses and cattle.

A Good Remedy.—A teacupful of mullein-seed mixed with shorts or oats, slightly wet, will bring the afterbirth from a cow in four hours, without fail. It is plentiful in the fall of the year, and should be stored up by every one who keeps a cow.

To Salt Beef.—Beef will keep well if packed in a mixture of four quarts salt, four pounds sugar, and one-quarter pound saltpetre to every one hundred pounds of meat. Use no water. If properly packed it will furnish its own fluid and will cook tender and juicy.

Remedy for Scours.—Among the many remedies given for scouring in stock, there is none better than strong coffee. We have saved the lives of colts, cows, calves and pigs. Make the coffee strong, and, if they cannot be induced to drink, pour it in through a funnel or from a bottle; but don’t pull out the animal’s tongue, as is recommended by some, because it is most sure to get into the windpipe. This remedy is simple and always on hand, and can be given safely in quantities to effect a cure.
Waterproof Grease for Boots.—Take a pound of the best fresh tallow or mutton suet and melt it in an earthenware dish with half a pound of beeswax and about half an ounce of rosin, and apply the compound to the leather while warm, but not too hot. The soles as well as the uppers should be well soaked with this preparation. The wax tends to render the leather more durable and pliable, because it is an excellent antiseptic. There is no better leather unguent than this.

Carbonate of Soda.—Dissolve common salt in water; sprinkle the same over your manure-heap, and the volatile parts of the ammonia will become fixed salts, from their having united with the muriatic acid of the common salt; and the soda thus liberated from the salt will quickly absorb carbonic acid, forming carbonate of soda; thus you will retain with your manure the ammonia that would otherwise fly away, and you have a new and important agent introduced—viz. the carbonate of soda, which is a powerful solvent of all vegetable fibre.

Paints.—In selecting paints for out-of-door work, the lighter colors should be preferred, as being the most durable and useful. The dark colors absorb the sun's rays, and occasion earlier decay of the material painted.

Nails.—Dip the tips of nails in grease, and they can then easily be driven into any hard wood where otherwise they would double and break.

RECIPES FOR THE STABLE.

Influenza, or "Pink-Eye," in Horses.—Under the above names are included many different diseases of the horse. It is, however, better to restrict the term "influenza" only to the epizootic disease of horses, which is analogous to the influenza of man, and accompanied by a catarrhal inflammation of the air-passages, with general debility or weakness of the animal.

The common term of "pink-eye" is used by horse-owners on account of the coloration and general appearance of the eye.

Drafts or currents of air, low and badly-ventilated stables, are regarded as predisposing causes.

The question of contagion is yet unsettled; many admit it, while many others deny it. The symptoms make their appearance suddenly; an animal apparently perfectly well at a given time may a few hours afterward be very sick. At first the animals may show only a slight loss of appetite, a little fever, which may vary in intensity, the pulse becoming quicker, the respiration increased, and the temperature rising several degrees. The throat becomes tender on pressure, and then a dry and painful cough appears. The eyes become bloodshot and swollen, with a discharge more or less abundant. Sometimes there is an inflammatory condition of the eye, followed by the formation of pus, and often the extremities are swollen. Soon a discharge from the nose takes place, at first thin and watery, afterward more pus-like in character. According to the type and severity of the disease and the peculiarity of the individuals, nervous symptoms show themselves or troubles of the chest and bowels are detected. Thus, we find symptoms of lung fever or bronchitis, colicky pains or inflammation of the bowels, complicating the original disease, and again rheumatic symptoms are sometimes observed. Generally, the disease runs a regular course, and lasts but a few days—from seven to ten, unless it becomes complicated. In the first case there is no fear for ultimate recovery, while in the other fatal results may occur.
The epizooty may last a short time, or it may continue for weeks or months; cases are recorded where it lasted a whole year. Irregular in its appearance and in its manipulations, it may affect a few horses or may lay up all the animals of a stable. When the disease is simple in its character there is no mortality; in the epizooty of Cleveland in 1860 it is said that only one horse died out of four hundred sick ones. When it is complicated the mortality is likely to be greater, and especially is this the case where the disease known as purples appears.

The treatment of simple influenza is very easy. Rest, care in the diet, abundant drinks, with small doses of saltpetre, are the principal things to be observed. Where there is sore throat employ slight counter-irritants by liniments and blisters. A mixture of honey or molasses, with liquorice, gum arabic and extract of belladonna, will allay the cough. If there is extreme debility, alcoholic stimulants may be given in the water, and if the administration of pills does not produce too much cough, two drams of carbonate of ammonia, with one dram of camphor, may be given. Careful attention to hygiene, proper ventilation, fresh and clean bedding, bandaging of the smaller extremities and judicious blanketing according to the condition of the external air, are of the greatest advantage in the management of influenza. Complications require a different treatment according to their nature. It is impossible to give any rules relating to the prevention of the disease, cleanliness and disinfection being about the only advice to give; but influenza will appear, no matter what precautions may have been taken against it.

Saddle-Galls.—To prevent saddle-galls the saddle should be lined with some smooth, hard substance. Flannel or woollen cloth is bad. A hard-finished, smooth rawhide lining, similar to that of the military saddles, is preferable. Then, if the saddle is properly fitted to the horse's back, there will be no galls unless the horse is very hardly used. Galls should be washed with soap and water, and then with a solution of three grains of copperas or blue vitriol to one tablespoonful of water, which will harden the surface and help to restore the growth of the skin. White hairs growing upon galled spots cannot be prevented.

— For galled shoulders on horses use equal parts of alum and salt finely pulverized. Dampen the sord and dust it on morning and evening. The horse can be used during treatment.

Remedy for Scratches in Horses.—Give the horse one-quarter of a pound of epsom salts per day for four days, then one tablespoonful of saltpetre per day for three days, then one spoonful per week for four weeks, after which time give a dose of saltpetre once a month.

For killing lice on cows, horses and hogs the following application is successful: Take the water in which potatoes have been boiled and rub it over the skin of the animal to be treated. The lice will be dead in two hours, and no further progeny appear.

Worms.—For worms in animals give a small quantity of sulphate of iron (green copperas) in their feed every other day for a week.

Harness Polish.—To make a good harness polish, take of mutton suet two ounces; beeswax, six ounces; powdered sugar, six ounces; lampblack, one ounce; green or yellow soap, two ounces; and water, one half pint. Dissolve the soap in the water, add the other solid ingredients, mix well and add turpentine. Lay on with a sponge and polish off with a brush.

Pigs.—To keep pigs in a healthy condition give a little salt in what is
given them to drink. Wood-ashes, containing a good quantity of charcoal, should be thrown into the pen, or, if only coal is used for fuel, charred pieces of wood will do as well.

**RECIPIES FOR THE HOUSEHOLD.**

*Water-tight Boot Soles.*—We recommend soaking the soles of boots and shoes in boiled linseed oil in a flat-bottomed vessel, and let the shoes or boots stand in it eight hours. Don’t have the oil deeper in the vessel than the thickness of the soles, as the oil would make the upper leather too hard. It fastens the pegs and makes the soles impervious to water.

*Calkimining.*—Calcimining is a very superior and elegant way of finishing a ceiling or wall. It is quite as easily done as the more common custom of whitewashing. Any housewife who can handle a whitewash-brush (the more skilfully the better) can perform the act quite as well as the best professional. The material used is to be had at the drug-stores, and is called “calcimine”? (kaolin prepared by some French method). For a ceiling, say fourteen feet by twenty-two, two pounds are sufficient, and it will cost twenty cents, and it is prepared for use in the following manner: Place your calcimine in a vessel of suitable size; then scald it with sufficient water to make it the consistency of hot mush; let it partly cool; then thin down with skimmed milk to the proper consistency for use. “Skimmed milk” is best, as the fatty or butter part of new milk would spoil the mixture. Observe these directions, and the material will be ready for use. Apply with a whitewash-brush. This mixture will work smoothly, and not drag under the brush, as most other mixtures for whitewash. It can be colored to suit the taste of those using it, or bought of different shades of color.

*Cement.*—For a cement that will resist the action of fire and water take half a pint of milk; mix with it an equal quantity of vinegar, so as to coagulate the milk; separate the curds from the whey, and mix the latter with the whites of four or five eggs, well beaten up. The mixture of these two being complete, add to them unslacked lime which has been passed through a sieve; make the whole into a thick paste, to the consistency of putty, when used. This cement has been used to close the fissure of an iron cauldron for the boiling of pitch, and which has been in use for five years without requiring further repairs.

*Ebbonizing.*—For ebonizing cherry-wood, powdered nut-galls and alum are boiled in water until a blackish color is obtained; the liquid is filtered and applied to the wood, which is next washed in a liquor made by digesting strong vinegar and a little oil of vitriol for some time with excess of iron turnings; thoroughly wash the wood, dry and oil. For staining fine woods the following is applicable: Four ounces of gallnuts, one ounce of powdered logwood, half an ounce of green vitriol and half an ounce of verdigris are boiled with water, and the solution, filtered hot, is applied to the wood, which is then coated with a solution of one ounce of fine iron filings dissolved by digestion in a small quantity of hot wine vinegar.

*Cement* for joining metals and non-metallic substances: Mix liquid glue with a sufficient quantity of wood-ashes to form a thick mass. The ashes should be added in small quantities to the glue while boiling, and constantly stirred. A sort of mastic is thus obtained, which, applied hot to the two surfaces that are to be joined, makes them adhere firmly together. A similar substance may be prepared by dissolving in boiling
water two and one quarter pounds of glue and two ounces of gum ammoniac, adding, in small quantities, about two ounces of sulphuric acid.

*Metric System.*—It may not be generally known that we have, in the nickel five-cent piece of our coinage, a key to the tables of linear measures and of weights. The diameter of this coin is two centimetres, and its weight is five grammes. Five of them placed in a row will, of course, give the length of the decimetre, and two of them will weigh a decigramme. As the kilolitre is a cubic metre, the key to the measure of length is also the key to measures of capacity. Any person, therefore, who is fortunate enough to own a five-cent nickel may carry in his pocket the entire metric system of weights and measures.

*A Home-made Telephone.*—The following recipe for making a telephone may afford much pleasure and amusement to our youthful readers, as well as older persons: Take two half-gallon (or quart) tin fruit-cans, and take the bottoms out of them. Now take a couple of half cigar-boxes; tack down the lids, and cut a hole through the bottom and lid of each, so you can fit in your cans, first bringing the ends level with the lid or bottom. Now stretch wet rawhide, parchment or bladder over the other end, and tie tight and let it dry, and your speaking-tubes are finished. Now take two ply of shoe-thread and wax it well, making it as long as you wish it. Punch a hole in the centre of the parchment head, poke the end of the string through, and put a knot on it to keep it from pulling back. Then put up your string like a telegraph-wire, but don't let it touch wood. Where you wish to support it or make a turn, run it through a loop of the same kind of string, but don't put the supporting loops closer together than is necessary to keep it up, and leave the string pretty loose to allow for contraction when wet. Fasten up your speaking-tubes at each end of the route, and you are ready to gabble away. You can bore large gimlet-holes in your window-sash to run the line through, keeping it from touching the sash with a loop as so described. The signal-call is to drum on the parchment end of the can with your fingers, or, better, pick the string like a harp about a foot from the head. These telephones are very useful and interesting, and can be used for a distance of five hundred yards.

*Rats.*—The following are effective remedies for exterminating rats: 1st. Warm water, one quart; lard, two pounds; phosphorus, one ounce. Mix thoroughly and thicken with flour. 2d. Carbonate of barytes, two ounces; grease, one pound. Mix thoroughly. Have a pan of water alongside, as it produces great thirst. 3d. To drive them away alive, take pulverized potash; put plenty in the holes. When left in the air it becomes moist. A rat will not trouble you again after it once gets its feet in it.

*Flies.*—Flies may be effectually disposed of without the use of poison. Take a half teaspoonful of black pepper in powder and one teaspoonful of cream. Mix them well together, and place them in a room on a plate where the flies are troublesome, and they will soon disappear.

*To get Rid of Ants.*—Wash your shelves down clean, and, while damp, rub fine salt on them quite thick, and let it remain on them for a time, and red ants will disappear.

*To Expel Mosquitoes.*—It is said that a room may be rid of mosquitoes by taking a piece of gum camphor about one-third the size of a hen's egg, and evaporate it by placing it in a tin vessel, holding it over a lamp or candle, taking care that it does not ignite. The smoke will soon fill the room and expel the mosquitoes.
To Drive off Red Ants.—Grease a plate with lard, and set it where the ants are troublesome; place a few sticks around the plate for the ants to climb upon; they will desert the sugar-bowl for the lard. Occasionally turn the plate over a fire where there is no smoke, and the ants will drop into it; reset the plate, and in a few repetitions you will catch all the ants; they will trouble nothing else while lard is accessible.

Water.—Use fresh water. Water which has stood in an open dish over night should not be used for cooking or drinking, as it will have absorbed many foul gases.

Paste.—Paste for family use similar to that used on postage-stamps and gummed labels: Dextrine, two ounces; acetic acid, four drachms; alcohol, four drachms; water, two and a half ounces. Mix the dextrine, acetic acid and water, stirring until thoroughly mixed; then add alcohol. For attaching labels to tin, first rub the surface with a mixture of muriatic acid and alcohol; then apply the label with a very thin coating of the paste, and it will adhere almost as well as on glass.

Feathers.—To utilize feathers of ducks, chickens and turkeys, generally thrown aside as refuse, trim the plumes from the stump, enclose them in a tight bag, rub the whole as if washing clothes, and you will secure a perfectly uniform and light down, excellent for quilting coverlets and not a few other purposes.

New Kettles.—To remove iron taste from new kettles, boil a handful of hay in them, and repeat the process if necessary. Hay-water is a great sweetener of tin, wooden and iron ware. In Irish dairies everything used for milk is scalded with hay-water.

Clothes-Line.—A new clothes-line is the terror alike of the husband who puts it out and takes it in, and the wife who uses it; but by boiling it for an hour or two it can be made perfectly soft and pliable. It should be hung in a warm room to dry, and not allowed to "kink."

To Exterminate Fleas.—Take half a pound of Persian insect-powder, half a pound of powdered borax, one ounce of oil of cedar, quarter of an ounce of oil of pennyroyal, properly put up by a druggist; close the room tight; sprinkle this powder on carpet, furniture and beds, and keep closed over day or night; then open all windows and air thoroughly, and in twenty-four hours there will be no fleas, flies or mosquitoes left; the rooms can then be swept and dusted. This applies nearly as well to roaches and water-bugs.

Recipe for Ink.—Here is a recipe for black ink, quickly made and good: To one gallon of boiling hot soft water add two ounces of extract of logwood and one-sixth of an ounce of bichromate of potash. For practical purposes take about one half a teaspoonful of logwood and potash as large as a small pea; put in teacup and pour half full of boiling water; stir till dissolved. A little alcohol put in will prevent freezing.

Soiled Collars.—The collars of coats become soiled very quickly from contact with the hair, but ammonia will clean them very quickly without any bad odor. Potato-starch water, made by grating potatoes into a little water and letting it settle, then pouring it off and rubbing it on with a sponge, will also take off the grease and spots.

Stain.—Walnut stain for pine and white woods: Very thin-sized shellac, one gallon; dry burnt umber, one pound; dry burnt sienna, one pound; lampblack, one-quarter pound. Shake until well mixed. Apply one coat with a brush, then sand-paper and apply a coat of shellac varnish.
Ground Glass.—To make imitation ground glass that steam will not destroy: Put a piece of putty in muslin, twist the fabric tight and tie it into the shape of a pad; well clean the glass first, and then putty it all over. The putty will exude sufficiently through the muslin to render the stain opaque. Let it dry hard, and then varnish. If a pattern is required, cut it out in paper as a stencil; place it so as not to slip and proceed as above, removing the stencil when finished. If there should be any objection to the existence of the clear spaces, cover with slightly opaque varnish.

Dry Cellars.—A perfectly dry cellar may be made even below the natural water-level of the ground by using asphaltum. For this purpose the floor should be covered with bricks laid flat and perfectly level; over this a layer of melted asphaltum poured, and on this bricks must be laid which have been dipped in hot asphaltum, so that there will be asphaltum in the joints between the bricks.

Bright Lights.—If you desire to render the flame of your lamp more brilliant without increasing the consumption, whether you burn oil, fluid or any of the products of petroleum, soak your wicks in vinegar and dry before using. This is an old idea, and, as it is easy, it ought to be tried.

To Purify Water.—Sprinkle a little powdered alum in the water, and in a few hours all impurities will be precipitated to the bottom, leaving the water pure and clear as spring water.

Rose-Leaves.—These are nice to put in cake. Gather as many as wished, chop fine, mix in a little white sugar, spread on plates and dry. When perfectly dry, pack in cans and keep air-tight.

Dress Wash.—A very nice thing for a lady to keep a bottle of this on her dressing-table always for little spots on her garments: One quart of boiling water, half an ounce of camphor, one ounce of borax; after cooling, half a pint of alcohol.

To Wash Red Table-Linen.—Use tepid water, with a little powdered borax, which serves to set the color; wash the linen separately and quickly, using very little soap; rinse in tepid water, containing a little boiled starch; hang up to dry in the shade, and iron when almost dry.

To Keep Hams Perfect.—The most easy way of keeping hams perfect is to wrap and tie them in paper and pack them in boxes or barrels with ashes. The ashes must fill all interstices, but must not touch the hams, as they absorb the fat. It keeps them sweet and protects from all kinds of insects.

To Wash Hair-Brushes.—Never use soap to wash hair-brushes. Take a piece of soda, dissolve it in warm water and stand the brush in it, making sure that the water only covers the bristles. It will almost instantly become white and clean. Place it in the air to dry with the bristles downward, and it will be as firm as a new brush.

Plaster Casts.—It is found that, by a simple process plaster casts may be converted into excellent imitations of terra-cotta ware. The colors required are brick-red, lampblack, zinc-white, and yellow ochre, all in powder, and the object to be treated is first carefully rubbed with “00” sand-paper, so as to remove all roughness of the surface of the ridges indicating where the parts of the mould have been joined. The mixed color consists of two parts of yellow ochre, two parts of brick-red and one part of black, these being well rubbed together; after this, three parts of zinc-white are separately mixed with a little milk to a paste, and all the ingredients are then combined in a mortar with eight or ten parts of milk, and the resulting mixture passed
through a fine sieve to remove any particles of the white. A soft brush is
next used to spread the stain over the object, care being taken to lay it on
evenly, and after twenty-four hours' drying a second coat is applied.

To Remove Stains with Buckwheat.—Mix buckwheat flour with cold
water to make a paste; rub this on the grease-spots; lay in the sun to dry
thoroughly; then brush off with a dry, hard brush. This will also remove
all stains from mattresses, etc.

Spots.—If ink has been spilled over rosewood or mahogany furniture,
half a teaspoonful of oil of vitriol in a tablespoonful of water, applied
with a feather, will quickly remove it.

Velvet that has been wet and becomes spotted: Hold the wrong side
over steam, and while damp, draw the wrong side quickly over a warm
iron. It takes two to do this—one to hold the bottom of the iron upward,
and the second to draw the velvet across.

Ivory that has been spotted or has grown yellow can be made as clear
and fresh as new by rubbing with fine sand-paper and then polishing with
finely-powdered pumice-stone.

Marble can be nicely cleaned in the following manner: Pulverize a little
bluestone, and mix with four ounces of whiting; add to these four ounces
of soft soap and one ounce of soda, dissolved in a very little water. Boil
this preparation over a slow fire fifteen minutes, stirring all the time. Lay
it on the marble while hot with a clean brush. Let it remain half an
hour; then wash off in clean suds, wipe dry, and polish by quick rubbing.
If marble is smoked or soiled, either by bituminous coal or too free use of
kindling-wood, Spanish whiting, with a piece of washing soda, rubbed
together and wet with only enough water to moisten and make them into a
paste, will remove the grease and smoke. Dip a piece of flannel in this
preparation, and rub the spots while the paste is quite moist. Leave the
paste on for hours, and, if need be, remove it and renew with fresh paste.
When the spots disappear wash the place with clean hot soapsuds, wipe
dry and polish with chamois-skin.

Oil-marks on wall-paper, or the marks where inconsiderate people rest
their heads, are a sore grief to good housekeepers, but they can be removed
without much trouble. Take pipe-clay or fuller's earth and make it into
a paste about as thick as rich cream with cold water; lay it on the stain
gently, without rubbing it in; leave it on all night. It will be dry by
morning, when it can be brushed off, and unless an old stain the grease-
spots will have disappeared. If old, renew the application.

Grease on a carpet, if not of long standing, can be readily disposed of
by washing the spot with hot soapsuds and borax—half an ounce of borax
to a gallon of water. Use a clean cloth to wash it with, rinse in warm
water and wipe dry.

Spermaceti dropped on any garment or furniture must be first carefully
scraped off—all that can be removed without injury to the material; then lay
brown paper over the spot or a piece of blotting-paper, and put a warm
iron on the paper until the oil shows through. Continue to renew the
paper and apply the warm iron until the paper shows no more oil.

Ink spilled on a carpet or woollen article should be attended to at
once while still wet, if possible, and then is very easily removed. Take
clean blotting-paper or cotton batting and gently sop up all the ink that
has not soaked in. Then pour a little sweet milk on the spot, and soak it
up from the carpet with fresh cotton batting. It will need to be renewed
two or three times, fresh milk and cotton being used each time, and the spot will disappear. Then wash the spot with clean soapsuds and rub dry with a clean cloth. If the ink has been allowed to dry in, the milk must remain longer and be repeated many times.

Grape Wine.—Ripe, fresh-picked domestic grapes, twenty pounds; put in a stone jar; pour over them six quarts of boiling soft water; when cool enough for the hands, squeeze well, after which let it stand three days on the pomace, with a cloth thrown over the jar; then squeeze out the juice; add ten pounds of nice crushed sugar; let it stand a week longer in the jar; then take off the scum, strain and bottle, leaving a vent until done fermenting; then strain again; bottle tight; lay the bottles on their sides in a cool place.

To Mend China.—Take a very thick solution of gum-arabic in water, and stir into it plaster of Paris until the mixture becomes of the proper consistency. Apply it with a brush to the fractured edges of the china, and stick them together. In three days the articles cannot be broken in the same place. The whiteness of the cement renders it doubly valuable.

Liquid Glue.—Dissolve one pound of the best glue in about one pound of water; add, gradually, one ounce of nitric acid and heat the mixture for a short time. This will save the trouble of heating the glue-pot.

A Good Cement.—Alum and plaster of Paris well mixed with water and used in a liquid state will form a very useful cement. It will be found quite handy for many purposes. It forms a very hard composition, and for fixing the brasses, etc. on lamps nothing could be better.

How to Make a Cement for Stoves.—Take iron filings, and mix to about the consistency of putty for glazing with white lead and linseed oil. Fill in the joints as securely as possible when the stove is cold, and let it stand a day or two before using.

Clean Silver.—To clean silver plate, fill a large saucepan with water; put into it one ounce of carbonate of potash and a quarter of a pound of whiting. Now put in all the spoons, forks and small plate, and boil them for twenty minutes; after which take the saucepan off the fire and allow the liquor to become cold; then take each piece out and polish with soft leather. A soft brush must be used to clean the embossed and engraved parts.

Clear Cellars.—To clear cellars of rats, pour a drop of oil of rhodium (obtained from a druggist) upon some bait in a common or wire-spring trap, and set in an infested locality. Only a short time will elapse ere the cage will be found occupied by vermin. Rats and mice possess a great liking for the oil, and, when scented, will risk anything to obtain it. The oil of rhodium costs about a cent per drop, but a drop will last for several days.

Wall Paper.—Paper can be made to stick on whitewashed walls by dissolving glue in good strong vinegar and washing them with the solution. Heat till the glue is dissolved, and then apply with a brush.

Lamp-chimneys can be prevented from cracking, when exposed to the burning flame, by first placing them in a vessel of cold water and bringing this to a boil over the fire, then removing the vessel and allowing it to cool before taking out the cylinder.

Fresh Meat.—To keep meat fresh in the absence of ice, simply immerse it in buttermilk. This will keep it for several days, when the milk should be changed and fresh milk substituted. In this way beef, veal, etc. can be kept for several weeks, and will be as sweet and fresh as when first put in. It is equally efficacious in the hottest weather.
Bread.—To make six loaves of best bread, set two quarts of sponge over night—one cup of good yeast mixed with water. In the morning boil six or eight large potatoes, and mash them; put in two quarts of milk; run through colander; stir with sponge in flour and set to rise. When light, put in two tablespoonsful of sugar; mould in loaves; set to rise; bake.

NOTES.

—Mix a little carbonate of soda with the water in which flowers are immersed, and it will preserve them for a fortnight. Common saltpetre is also a very good preservative.

—Take a new flower-pot, wash it clean, wrap it in a wet cloth, and set it over butter; it will keep it as hard as if on ice. Milk, if put into an earthen can, or even a tin one, will keep sweet for a long time if well wrapped in a wet cloth.

—Common soda is excellent for scouring tin, as it will not scratch the tin, and will make it look like new. Apply with a piece of moistened newspaper and polish with a dry piece. Wood-ashes are a good substitute.

—If salt is added to meat in large quantities, it prevents the appearance of the red color, but if it is applied a little at a time, and the meat is afterward smoked, a good red is obtained.

—The Chemical News states that a strong solution of sulphate of magnesia will give a beautiful quality to whitewash, and a little of it used with starch will add considerably to its stiffness, and render cotton or linen garments to a certain extent incombustible.

—To remove the disagreeable taste from new kegs, churns or other wooden vessels, first scald them with boiling water, then dissolve some pearlash or soda in lukewarm water, adding a little lime to it, and wash the inside of the vessel well with the solution; afterward scald it well with plain hot water before using.

—For preparing pickles, cold vinegar should be used; a small piece of alum in each jar makes them firm and crisp.

—Every hour’s exposure to the light after an Irish potato has been dug from where it grew deteriorates its quality.

—Eggs, when put in water, will, if good, invariably swim with the large end upward; if not, they are bad.

RECIPES FOR THE SICK ROOM.

Salt for the Throat.—Diseases of the throat are so prevalent, and in so many cases fatal, that a word in behalf of a most effectual, if not positive, cure for sore throat is timely. For more than forty years we have been subjected to sore throat, and more particularly to a dry, hacking cough, distressing to ourself and those with whom we are brought into contact. We were induced to try the virtue of common salt. We commenced by using it three times a day, morning, noon and night. Dissolve a large teaspoonful of pure salt in a small tumblerful of water. With this gargle the throat most thoroughly just before meal-time. During the entire winter we were not only free from coughs and colds, but the dry, hacking cough entirely disappeared. We attribute these satisfactory results to the use of the salt gargle, and recommend it to those who are subject to diseases of the throat. Persons who have never tried the salt gargle have the impression that it is unpleasant. Such is not the
case. It is pleasant, and after a few days' use no person who loves a nice clean mouth and a first-rate sharpening of the appetite will abandon it.

_Bunions._—To cure bunions use pulverized saltpetre and sweet oil. Obtain at a druggist's five or six cents' worth of saltpetre; put it into a bottle with sufficient olive oil to dissolve it; shake it up well, and rub the inflamed joints night and morning, and more frequently if painful.

_Cure for a Bone Felon._—Of all painful things, can there be anything so excruciatingly painful as a bone felon? As soon as the disease is felt put directly over the spot a fly blister about the size of your thumb-nail, and let it remain for six hours, at the expiration of which time directly under the surface of the blister may be seen the felon, which can be instantly taken out with the point of a needle or a lancet.

_Poison._—A poison of any conceivable description and degree of potency which has been intentionally or accidentally swallowed may, it is said, be rendered almost instantly harmless by simply swallowing two gills of sweet oil. A person with a very strong constitution should take nearly twice the quantity. This oil, it is alleged, will most positively neutralize every form of vegetable, animal or mineral poison with which physicians and chemists are acquainted.

_Stye._—A poultice of fresh tea-leaves, moistened with water, will cure a stye on the eyelid.

_Earache._—For earache dissolve assafoetida in water; warm a few drops and drop in the ear; then cork the ear with wool.

_Burns and Scalds._—The true physiological way of treating burns and scalds is to at once exclude the air with cotton batting, flour, scraped potato or anything that is handiest.

_Sick Stomach._—The following drink for relieving sickness of the stomach is said to be very palatable and agreeable: Beat up one egg very well, say for twenty minutes; then add fresh milk one pint, water one pint, sugar to make it palatable; boil, and get it cool; drink when cold. If it becomes curds and whey, it is useless.

_Cure for Croup._—A medical journal says croup can be cured in one minute, and the remedy is simply alum and sugar. The way to accomplish the deed is to take a knife or grater and shave off in small particles about a teaspoonful of alum; then mix it with twice its quantity of sugar to make it palatable, and administer as quickly as possible. Almost instantaneous relief will follow.

_Important Hints about the Feet._—As the feet are kept more closely covered than any other part of the body during the day, they should be thoroughly washed and rubbed till dry every night. Impurities gather as the result of the confined perspiration, and these should be removed before sleeping.

_Scalds and Burns._—One of the simplest and most useful remedies for scalds and burns is said to be an embrocation of lime-water and linseed oil. These simple agents combined form a thick, cream-like substance which effectually excludes the air from the injured parts and allays the inflammation almost instantly. This remedy leaves no hard coat to dry on the sores, but softens the parts, and aids Nature to repair the injury in the readiest and most expeditious manner. The mixture may be procured in the drug-stores; but if not thus accessible, slack a lump of quicklime in water, and as soon as the water is clear mix it with the oil and shake it well. If the case is urgent, use boiling water over the lime, and it
will become clear in five minutes. The preparation may be kept ready bottled in the house, as it will be as good when six months old as when first made.

**How to Toast Bread.**—Keep the bread a proper distance from the fire, so as to make it of a straw color. It is spoiled if black, or even brown.

**Toast-Water.**—Take a slice of bread about three inches across and four long, a day or two old. When it is browned, not blackened, pour on it a quart of water which has been boiled and afterward cooled. Cover the vessel, and after two hours pour off the water from the bread gently. An agreeable flavor may be imparted by putting a piece of orange or lemon peel on the bread at the time the water is first poured on the bread.

**Beef Tea.**—Cut into thin slices a pound of lean meat, pour on a full quart of cold water, let it gradually warm over a gentle fire; let it simmer half an hour, taking off the scum; strain it through a napkin. Let it stand ten minutes, then pour off the clear tea.

**Cracked Wheat.**—Dry some common wheat, then grind it in a coffee-mill; boil it three or four hours; add a little salt; a little milk, butter, cream or molasses may be added, as in using hominy. It should always be washed clean, and then boiled long enough to become of the consistence of boiled rice or hominy. A pint of wheat dried and ground is enough for a day; not to be used for supper.

**Boiled Flour and Milk.**—Take a pint of flour; make it into a dough-ball with water; tie it tightly in a linen bag; put it into a pan of water, covering the ball, and let it boil two hours; place it before the fire to dry, cloth and all; take it out of the cloth, remove the skin, dry the ball itself. Grate a tablespoonful of this, and stir it into a pint of boiling milk until a kind of mush is formed.

**Clothes on Fire.**—Instantly roll the patient in rug, carpet or blanket, thus smothering the fire. Be cautious.

**Painting.**—Lay patient flat on back, with head as low as or lower than the body; unloose dress; apply smelling-salts to nostrils, or, if they are not at hand, burn a piece of rag under nose; dash cold water in the face; give fresh air.

**Scalds or Burns.**—Instantly and liberally apply dry flour, and keep it in its place by a bandage. Another excellent application is "prepared lard"—that is, lard without salt. Druggists keep it. If only salt lard is at hand, wash out the salt in cold water. Do not apply cold water, salt, spirits or vinegar. If the burn be in the leg or foot, slit the stocking, so as to avoid breaking the skin.

**Dressing Scalds or Burns.**—Do not wash the wound, and do not dress it oftener than on alternate days. Do not rub or roughly handle the affected parts. If there be much discharge, do not wipe, but gently sop with soft cloth. No ulcer should be often dressed, as by removing the excrement we are likely to rub off also the new flesh.

**Purified Air.**—To purify the air by the cheapest and simplest method set a pitcher of water in a room, and in a few hours it will have absorbed all the expired gases in the room, the air of which will have become purer, but the water utterly filthy. The colder the water is, the greater the capacity to contain these gases. At ordinary temperature a pail of water will contain a pint of carbonic acid gas and several pints of ammonia. The capacity is nearly doubled by reducing the water to the temperature of
ice. Hence, water kept in a room a while is always unfit for use. For the same reason the water from a pump should always be pumped up in the morning before any of it is used. Impure water is more injurious than impure air.

**Burns.**—Alcohol applied immediately will give instant relief to burns and scalds, and generally prevent blistering. If it is a part of the body that cannot be immersed in the alcohol, apply it with a piece of cotton wet with it. Keep it saturated with it. Avoid the fire when using it, as it is inflammable.

**Cubeb-berries for Catarrh.**—A new remedy for catarrh is crushed cubeb-berries smoked in a pipe, emitting the smoke through the nose; after a few trials this will be easy to do. If the nose is stopped up, so that it is almost impossible to breathe, one pipeful will make the head as clear as a bell. For sore throat, asthma and bronchitis swallowing the smoke affords immediate relief. It is the best remedy in the world for offensive breath, and will make the most foul breath pure and sweet. Sufferers from that horrid disease, ulcerated catarrh, will find this remedy unequalled, and a month's use will cure the most obstinate case. A single trial will convince any one. Eating the uncrushed berries is also good for sore throat and all bronchial complaints. After smoking, do not expose yourself to cold air for at least fifteen minutes.

**Bleeding.**—To stop bleeding take the fine dust of tea and bind it on the wound—at all times accessible and easily obtained. After the blood has ceased to flow, laudanum may be advantageously applied to the wound. Due regard for these instructions may save much trouble.

**A New Cure for Rheumatism.**—One of the latest things is that celery is a cure for rheumatism; indeed, it is asserted that the disease is impossible if the vegetable be cooked and freely eaten. The fact that it is almost always put on the table raw prevents its therapeutic powers from becoming known. The celery should be cut into bits, boiled in water until soft, and the water drunk by the patient. Put new milk, with a little flour and nutmeg, in a saucepan with the boiled celery; serve it warm with pieces of toast, eat it with potatoes, and the painful ailment will soon yield. Such is the declaration of a physician who has again and again tried the experiment, and with uniform success.

**Lemon-juice in Diphtheria.**—A most efficient means for the removal of membrane from the throat, tonsils, etc. in diphtheria: The juice of a lemon applied by means of a camel's hair brush to the affected part every two or three hours.

**Whooping Cough.**—The following is a specific for whooping cough, and will cure in from two days to two weeks: Nitric acid, diluted, twelve fluid drachms; compound tincture of cardamoms, three fluid drachms; syrup, three and a half fluid ounces; water, one fluid ounce. Mix. One to two teaspoonfuls every two hours, according to the age of the child.

**New Cure for Burns.**—It has been ascertained that the very best remedy for burns and scalds is the application of common cooking soda or any other alkali in a neutral form, which will afford instantaneous cessation from pain. In all cases of superficial burning this simple treatment will effect a perfect cure in a few hours, and the severest burns and scalds soon yield to it.

**An Asserted Sure Cure for Cancer.**—Use the extract of sheep-sorrel prepared as follows: Gather the sheep-sorrel when green, place it in a
mortal, beat it up very fine, express the juice, strain it in order to get rid of the lint and trash. Place the juice in a deep plate, and set it in the sun until it evaporates to the consistency of molasses or honey. Spread the salve thus produced on a piece of kid or on a linen cloth, and apply to the affected part, renewing it two or three times a day. This application in two or three days will cause the ulcerous part to slough off, after which apply a simple ointment to heal the sore. The remedy is sure, and causes considerable pain, but it is otherwise harmless. If the patient has the nerve to stand the pain, it produces, it will effect a radical cure.

Poison Ivy.—The Medical Record gives a specific for the troublesome eruption produced by the poison oak or poison ivy (Rhus toxicodendron) so common in our woods, and so often mistaken for the Virginia creeper, which the plant somewhat resembles. This specific is found in bromine. The drug is dissolved in olive oil, cosmine or glycerine, in the strength of from ten to twenty drops of bromine to the ounce of oil, and the mixture rubbed gently on the affected part three or four times a day. The bromine is so volatile that the solution should be renewed within twenty-four hours from its preparation. The eruption never extends after the first thorough application, and it disappears within twenty-four hours if the application is persisted in, and the patient is entirely cured.

A Recipe for Rheumatic Liniment.—Such excellent results follow from the following recipe for rheumatic affections that it would be doing good to a great many to place it within the reach of all: Oil origanum, one ounce; oil cedar, one ounce; gum camphor, two ounces; cayenne pepper, two ounces; castile soap, two ounces; alcohol, one pint. Apply with flannel and heat. Not to be used in the region of the lungs. Any physician can tell you that it is safe; any one who has tried it will be likely to say it is more.

An Alleged Remedy for Hydrophobia.—When bitten by a rabid dog bathe the wound with warm vinegar and water, and when this has dried pour a few drops of muriatic acid upon the bite, which will destroy the poison of the saliva and relieve the patient from all danger. An old German forester discovered the remedy, which he said had been used successfully for fifty years.

Hydrophobia.—Garlic has always had a great reputation among anti-hydrophobia remedies, and is found as a principal ingredient in a large number of formulae long kept secret. A young man bitten by a mad dog was shut up in a loft. In his delirium he seized upon some bundles of dried garlic, ate greedily of it, fell into a deep sleep, and awoke calm and cured.

—Youatt, the well-known veterinary surgeon, who has been bitten eight or ten times by rabid animals, says that crystals of the nitrate of silver rubbed into the wound will positively prevent hydrophobia in the bitten person or animal.

Mixture for a Cough or Cold.—Take one teacupful of flaxseed and soak it all night. In the morning put into a kettle two quarts of water, a handful of liquorice-root split up, one quarter of a pound of raisins broken in half. Let all boil half an hour or more, watching and stirring, that the mixture may not burn. Then strain and add lemon-juice and sugar.

Flaxseed Syrup.—This excellent remedy for cough is made thus: Boil one ounce of flaxseed in a quart of water for half an hour; strain and add to the liquor the juice of two lemons and half a pound of rock candy.
the cough is accompanied by weakness and a loss of appetite, add half an ounce of powdered gum-arabic. Set this to simmer for half an hour, stirring it occasionally. Take a wine-glassful when the cough is troublesome.

Remedy for Earache.—Take a bit of cotton batting, put upon it a pinch of black pepper, gather it up and tie it; dip it in sweet oil and insert it in the ear. Put a flannel bandage over the head to keep it warm. It will give immediate relief.

Cure for Hiccough.—Hold both the patient’s wrists tightly, and it will stop the hiccoughs immediately.

To Cure Sore Throat.—Take the whites of two eggs and beat them with two spoonfuls of white sugar; grate in a little nutmeg, and then add a pint of lukewarm water. Stir well and drink often. Repeat the preparation if necessary, and it will cure the most obstinate case of hoarseness in a short time.

Recipe for Croup.—Take the yolk of an egg, stir into it a teaspoon and a half of rye meal; spread this on a cloth and apply it to the throat and keep the child warm. If it is very tight before you can apply this remedy, cause a vomit, and then put on the egg.

To Cure Corns.—Take the substance which sticks to the side of a soft-soap barrel after the soap is used out, and mix with pulverized white chalk to the consistency of a salve. Apply every twelve hours in a rag until the corn is removed. It will cure every case of corns in six days.

Sure Remedy for a F felon.—Take a pint of common soft soap and stir in air-slacked lime till it is of the consistency of glazier’s putty. Make a leather thimble, fill it with this composition and insert the finger therein, and a cure is certain.

Chapped Hands.—Rub the hands thoroughly with linseed oil, then wash in castile or bar soap. It will remove pitch, and when the hands have become grimy by hard work it will make them clean and soft. It is the best thing to remove cracks or sores in cows’ teats; moisten them with oil after the milk is drawn. It will also remove any scent from the hands after milking.

Lemon for Cough.—Roast the lemon very carefully without burning it; when it is hot, cut and squeeze into a cup upon three ounces of sugar, finely powdered. Take a spoonful whenever your cough troubles you. It is good and agreeable to taste. Rarely has it been known to fail of giving relief.

For Croup.—Slice onions, and put sugar on the slices in layers—the syrup being administered. Keep it before the people as a sovereign and almost instantaneous remedy.

To Cure Hoarseness.—When the voice is lost, as is sometimes the case from the effects of a cold, a simple, pleasant remedy is furnished by beating up the white of an egg, adding the juice of one lemon, and sweetening with white sugar to the taste. Take a teaspoonful from time to time. It has been known to effectually cure the ailment.

Remedy for Croup and Cough.—It has never failed in relieving a cough and curing the croup when given in season: Sweet spirits of nitre half an ounce, sweet oil half an ounce, juice of one large lemon, honey one gill, lobelia half an ounce; dose, one teaspoonful every time you cough. Shake the bottle well every time before turning out.
Neuralgia.—A very simple relief for neuralgia is to boil a handful of lobelia in a half pint of water till the strength is out of the herb, then strain it off and add a teaspoonful of fine salt. Wring cloths out of the liquid as hot as possible and spread over the parts affected. It acts like a charm. Change the cloths as soon as cold till the pain is gone; then cover the place with a soft dry covering till all perspiration is over, so as to prevent taking cold.

Antidote for Poison.—A standing antidote for poison by dew, poison oak, ivy, etc. is to take a handful of quicklime, dissolve in water, let it stand half an hour, then paint the poisoned parts with it. Three or four applications will never fail to cure the most aggravated cases. Poison from bees, hornets, spider bites, etc. is instantly arrested by the application of equal parts of salt and bicarbonate of common soda well rubbed in on the place bitten or stung.

—A piece of cotton moistened and filled with salt and alum applied to an aching tooth will give instant relief.

FACTS WORTH KNOWING.

EXCELLENT INTEREST RULES.

For finding the interest on any principal for any number of days, the answer in each case being in cents, separate the two right-hand figures of answer to express in dollars and cents:

Four per cent.—Multiply the principal by the number of days to run, separate right-hand figure from product and divide by 9.

Five per cent.—Multiply by number of days and divide by 72.

Six per cent.—Multiply by number of days, separate right-hand figure and divide by 6.

Eight per cent.—Multiply by number of days and divide by 42.

Nine per cent.—Multiply by number of days, separate right-hand figure and divide by 4.

Ten per cent.—Multiply by number of days and divide by 36.

Twelve per cent.—Multiply by number of days, separate right-hand figure and divide by 3.

Fifteen per cent.—Multiply by number of days and divide by 24.

SQUARE RODS AND FEET IN AN ACRE.

An acre contains 43,560 square feet.

A plot of ground 208 3/4 feet square is very near an acre, being just 1/18 of a rod over. A nearer approximation is 208 feet and 81 1/2 inches. The square of this number differs less than a foot from an acre, being 43,559 5/8 feet.

A plot of ground 12 rods 10 feet and 81 1/2 inches square is an acre. For ordinary purposes it will answer to take a plot 12 3/8 rods square, which will give 160 5/8 rods, 160 being an acre.

An acre is contained in a plot 3 by 53 1/4 rods, or 4 by 40, or 5 by 32, or 6 by 26 3/4, or 7 by 22 5/16, or 8 by 20, or 9 by 17 11/16, or 10 by 16, or 11 by 14 5/16, or 12 by 13 5/16. Our farmer-boys can soon learn this last table, and it will often be of use to them.
BUSINESS LAW.

The following compilation is worth a careful preservation, as it contains the essence of a large amount of business law:

A note made on Sunday is void.
Contracts made on Sunday cannot be enforced.
A note made by a minor is void.
A contract made with a minor is void.
A contract made with a lunatic is void.
A note obtained by fraud or from a person in a state of intoxication cannot be collected.
It is a fraud to conceal a fraud.
If a note is lost or stolen, it does not release the maker; he must pay it if the consideration for which it was given and the amount can be proven.
Notes bear interest only when so stated.
Principals are responsible for the acts of their agents.
Each individual in a partnership is responsible for the whole amount of the debts of the firm, except in cases of special partnership.

Ignorance of the law excuses no one.
The law compels no one to do impossibilities.
An agreement without consideration is void.
Signatures made with a lead pencil are good in law.
A receipt for money is not always conclusive.
The acts of one partner bind all the rest.

"Value received" is usually written in a note, and should be, but is not necessary. If not written it is presumed by the law or may be supplied by proof.

A note indorsed in blank (the name of the indorser only written) is transferable by delivery, the same as if made payable to bearer.
If the time of payment of a note is not inserted, it is held payable on demand.
The time of payment of a note must not depend upon a contingency.
The promise must be absolute.
A bill may be written upon any paper or substitute for it, either with ink or pencil.
The payee should be distinctly named in the note, unless it is payable to bearer.

An indorsee has a right of action against all whose names were on the bill when he received it.
No consideration is sufficient in law if it be illegal in its nature.
Checks or drafts should be presented during business hours; but in this country, except in the case of banks, the time extends through the day and evening.
If two or more persons as partners are jointly liable on a note or bill, due notice to one of them is sufficient.

If a note or bill is transferred as security, or even as payment of a pre-existing debt, the debt revives if the note is dishonored.
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