of iodine, and then with chloride of zinc, or dilute sulphuric acid, and again observed. The portions colored blue will show how much of the cell wall retains its original character, and those which are reddish-brown show the infiltration and deposit of the incrusting matter. A similar section is next to be treated in the same way, after having been boiled in a solution of caustic potash, or soda. The increased portion colored blue and the diminution of the red will show how much of the useless incrusting matter has been removed, and by repeating the experiment we can soon obtain an approximate estimation of the amount of and the cost of removing the useless ingredients. We can also obtain a correct idea of the outline of the section of the individual cells, whether angular, rounded, or ribbed, points which we have before shown are of no little value. A small portion of a very thin shaving of the wood, in a longitudinal direction, is, after boiling in an alkaline solution, again examined. If the cells are not well separated, we may resort to some of the more powerful reagents, or if the shaving is, microscopically speaking, thin enough, we may use needles to tear the cells apart. We then observe the length of the individual cells, and, above all, the markings upon them, which show the uniformity or spiral arrangement of the thickened portions. We are then prepared to give, in accordance with what has been said above, a good approximate estimate of the value of the wood as a material for paper-making.

We have selected wood as an illustration, because we have not, as yet, particularly described its structure, and because two important points, the length of the cells and the quantity of incrusting matter, are brought under consideration. Almost any substance, otherwise useful as fiber, may be converted into paper, yet the relative values of different materials may be determined by the methods above described.

Structure of wood cells.—As a general rule, the cells of wood are short, with pointed ends, and may sometimes be even too short for paper stuff. Interspersed among the true wood cells, we always find the ducts, described above, with the single exception of the pine family. which may always be recognized by the "disks," with a "pore" in their center, found generally on the radial surface of the cells. In the *Coniferæ*, or pines, we often find an abundance of resin; this, like the incrusting matter, must be removed by an alkaline solution.

In the Pine family, which most largely contributes wood for the manufacture of paper, we find notable differences in the character of the cells, and are thus able, even in fossil woods, to determine the exact character of the plant. Without any trial, we can say that the yew (*Taxus*,) and its ally *Torreya*, would furnish a material for paper, with peculiar properties, derived from the remarkable spiral thickening of the cells. Unfortunately, trees of these genera are not abundant enough to warrant even an experimental examination.

In some woods, in addition to the medullary rays, made up of what we have called pith cells, there is another tissue of similar cells, which cannot be expected to add to the strength of paper stuff.

Economy of using wood for paper stuff.—It is, therefore, easy to determine what sort of wood is best adapted to paper-making, and we have in our collection specimens which show that the range of choice is by

no means limited. But another question of economy arises, which has excited much inquiry and invention, namely, the most advantageous method of reducing solid wood to the requisite degree of fineness, for subsequent treatment. A good rule, equally applicable to the manures of the farmer and to the supply of the paper-making material, we would give in a few words: *use what others waste*. If the thousands of tons of saw-dust, annually wasted at the different saw-mills in the country, could be collected in one place, there would be no want of material for paper of a certain quality. But as this cannot be done, we may fairly suppose that, in some localities, an abundant supply may be maintained; if not, resort must be had, provided that the wood itself is cheap enough, to mechanical means of disintegration, which are beyond the bounds of our present inquiry.

When grass, straw, or herbaceous plants are used for making paper, a new matter for consideration arises. The great abundance of pith cells in these is wholly, or in part, removed, and passes off as waste, either in the treatment with alkaline solutions, or from the paper engine. The exact weight of solid matter in such materials cannot, therefore, be reproduced as paper, and the loss must be accompanied by a corresponding cost in the process which causes the loss. In such cases, again, a microscopical examination of the material may afford an approximate estimate of its value.

We would like, in this connection, to refer to a process of paper-making in some respects quite different from that which is used among us, yet in the East has made paper a substitute for cloth and for other fabrics, which we manufacture at a great cost. But, without space to describe even the specimens illustrative of this point, we must, for the present, abstain from entering upon new matter.

In conclusion, we have to say that the foregoing is to be regarded as the mere outline or sketch of the research of several years, which might, if expanded into details, have filled a goodly volume. Our endeavor has been to give a general view of the subject, trusting it may prove interesting, and even profitable, to the reader, furnishing at the same time sufficient indications of the course to be pursued if he should be desirous of further information.

In general, we have abstained from quoting authorities as out of place in an article of this kind. But no statement has been made which cannot be substantiated by sufficient authority, or by our own demonstration. Considered as a mere sketch of what might have been said, we must beg those who are well informed upon any one particular point to remember that, if we had noticed everything by the way, our article would have increased to a volume, and to believe that the omissions which may be criticised by them are regretted by us.

IMPORTANCE OF SALT IN AGRICULTURE.

If we should ask why so enormous a quantity of this inestimable gift of salt is distributed throughout the earth; why three fourths of the surface of the planet designed for the home of man is covered with

it? the answer would be: In order to preserve the work of Nature, to enable man the more readily to sustain himself, and to make him wealthier and better. It has become an indispensable condition for the existence of man, and his civilization. In all organic beings we meet with two processes—that of life and that of decomposition—the latter beginning its full activity after the former has achieved its end, at the moment when organic beings are dissolved into those constituents from which the plant was formed and nourished.

If, however, we intend to check, or, at least, delay decomposition, we must employ acids, for we know that the Creator formed of the sea-salt a mighty barrier against the immeasurable mass of water becoming putrid; we know that our stocks of flesh, grease, &c., are preserved by the application of salt; that cabbage-water, acids in general, and kitchen-salt are the means employed by the agriculturist against septic diseases in our domestic animals, and against diseases of the mouth and feet. The separation of milk and deposit of meat will be increased by the application of salt, thus forming an essential means for the promotion of cattle-raising. By the application of salt, the fruits, especially wine, will become much better; and even the ancients were in the habit of throwing salt on their grounds, their vineyards, and fruit trees. Agricultural chemistry informs us that the simplest combinations through which nourishment is conveyed to plants consist in acids, alkalies, and alkaline substances. Animal chemistry shows that free muriatic acid and kitchen-salt form the principal constituents of the contents of the stomach.

In a French prize paper, by Dr. Desaive, on the manifold advantages of the use of salt in agriculture, the following results have been laid down by the celebrated French veterinary surgeon, Grogniez:

Common salt serves as a preventive of the fermentation and heating of hay, which has been heaped up in large stacks during wet weather. Forty quintals of hay require fifteen pounds of salt, to be strewn among it in alternate layers.

This effect is much better shown in straw, which, if intended to be used as fodder, by being moistened with salt-water, may be preserved for a long time, when it can be given to cattle instead of hay—a method in use among the ancients.

Leaves of trees, when put in ditches with salt, may be prevented for a long time from putrefactive fermentation, and will even make good forage. Intelligent farmers of the Mont d' Orlyonais are in the habit of thus preserving their vine leaves as fodder for goats.

Fodder of inferior quality, for instance, straw, or other kinds, soaked and bleached by rain and sun, cured too late, or become woody, may be rendered more palatable and easy of digestion by being salted. A pound of salt in three quarts of water is required for a quintal of bad hay.

The sharp taste which the milk of cows usually assumes in consequence of beets, turnips, and white cabbage being continually fed to them, can be removed by salting those vegetables.

In Flanders, common salt is strewn on new and wet oats, to be fed to horses, and, thus prepared, will not be dangerous to the animals. The same application may also be made to hay newly harvested, to prevent injuries when it may become necessary to feed such hay, the moisture of which has not been fully evaporated.

Though the bad qualities of dusty, muddy, or moldy fodder, after having been washed and threshed, are not entirely removed, yet, by giving a sprinkling of salt-water, they will be diminished to a considerable degree. This fact will be of advantage to the farmer whenever he may be in want of appropriate fodder.

By means of salt, such water as otherwise could not be used for cattle for drinking, will be rendered proper.

The great advantages to be derived from common salt with regard to the health of cattle have been clearly shown by many experiments made by that learned and celebrated agriculturist of Alsace, M. Boussingault. Cattle, by being fed with salt, receive a soft and glossy skin, their digestion and appetite are in good order, and they increase in flesh and strength. Cows thus fed yield much milk, while those treated otherwise have dull skins, with rough hairs, exhibit less appetite, produce a smaller amount of flesh, and yield not only an inferior quantity, but also quality, of milk.

Manure from cattle fed with salted fodder is also of a better quality.

Finally, manuring with salt will banish mosses and hurtful parasitical plants from meadows.

SOME HINTS UPON FARM HOUSES.

(BY SAMUEL D. BACKUS, ARCHITECT, NEW YORK.)

An intelligent traveler, in passing through our country, will observe among neighboring agriculturists, a great similarity in the modes of cultivation adopted, in the cattle reared, the horses driven, the vehicles, and farm implements used, the machines employed, the crops raised, the barns erected, and the general means and manner of pursuing their avocations, each following what is shown to be a good example, and all agreeing in the course which their combined experience has shown to be advantageous. But it is a frequent occasion of wonder that a class so quick to perceive, so shrewd in judging, and so prompt to adopt any improvement which may lighten their labors, increase their profits, or permanently benefit their lands, should, in their own dwellings, exhibit so great a diversity of style, construction, and real value. There is not merely such a wholesome variety as would arise from peculiarity of situation or disposition, but sometimes a difference so entire as to show that neighboring builders, who, upon other matters seem to think alike, have either disagreed radically respecting the purposes for which their dwellings were to be erected, or have failed to give those purposes a due consideration.

With all this dissimilarity of design, there are very few American dwellings, except some of the log-houses reared for temporary use by