Papers Presented to Local Branches

WHITE PINE BARK OF COMMERCE.*

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White pine bark is one of our native drugs which is profitably marketed, as it is a by-product in the preparation of pine timber. At certain times of the year there is quite a demand for the bark, as it is used in the preparation of Syrup of White Pine Compound, N. F.

In the March number of the A. Ph. A. Journal, the Committee on Unofficial Standards gave the proposed standard for white pine bark, which is as follows:

"In flat pieces of very variable size and about 1 to 3 mm. thick; outer surface varying from a pale pinkish white, when fresh, to a light, or rather deep yellowing brown, according to freshness, occasionally with small patches of the gray-brown periderm adhering, more or less fuzzy, and often showing small scattered pits, inner surface either lighter or darker than the outer, finely striate; fracture tough-fibrous, transverse section an outer yellowish and an inner whitish band. Odor slight, terebinthinate. Taste slightly mucilaginous, bitter-sweet and astringent.

"Upon incineration White Pine Bark should yield not more than 2 per cent. of Ash."

After reading the description carefully, I began to study the white pine bark of the market in order to ascertain if it would meet the requirements established. I found that it would do so in nearly every case. One or two lots, however, would not meet the requirements, as the bark was unrossed. In these lots I noticed that the inner surface showed a great many small resin masses while there were scarcely any to be seen on the inner surface of the rossed bark. This led me to examine the cross secions of the two barks. The pharmacognosist divides the bark into three zones. First, the outer bark, consisting of the corky epidermis; second, the middle bark extending from the cork to the beginning of the medullary rays, and third, the inner bark, extending from the beginning of the medullary rays inward. The rossed pine bark usually consists of the inner bark, the outer and middle bark being removed in peeling. The structure of rossed and unrossed bark must, therefore, vary greatly; as well as the nature of its cell contents, and this would seem to have a bearing on its medicinal value. Most of the secretion cavities and cells occur in the outer bark. As these are the cells which secrete the resin, it should follow that a rossed bark would be much lower in resin content. In the description, it states that the bark often shows small scattered pits. It is in these pits or cavities that the oleo-resin is secreted. In peeling the bark the resin is removed even though a portion of the cavity still remains. In the unrossed bark, the epidermis protects these cavities and as the bark dries, the

*Read before the New York Branch April 8.

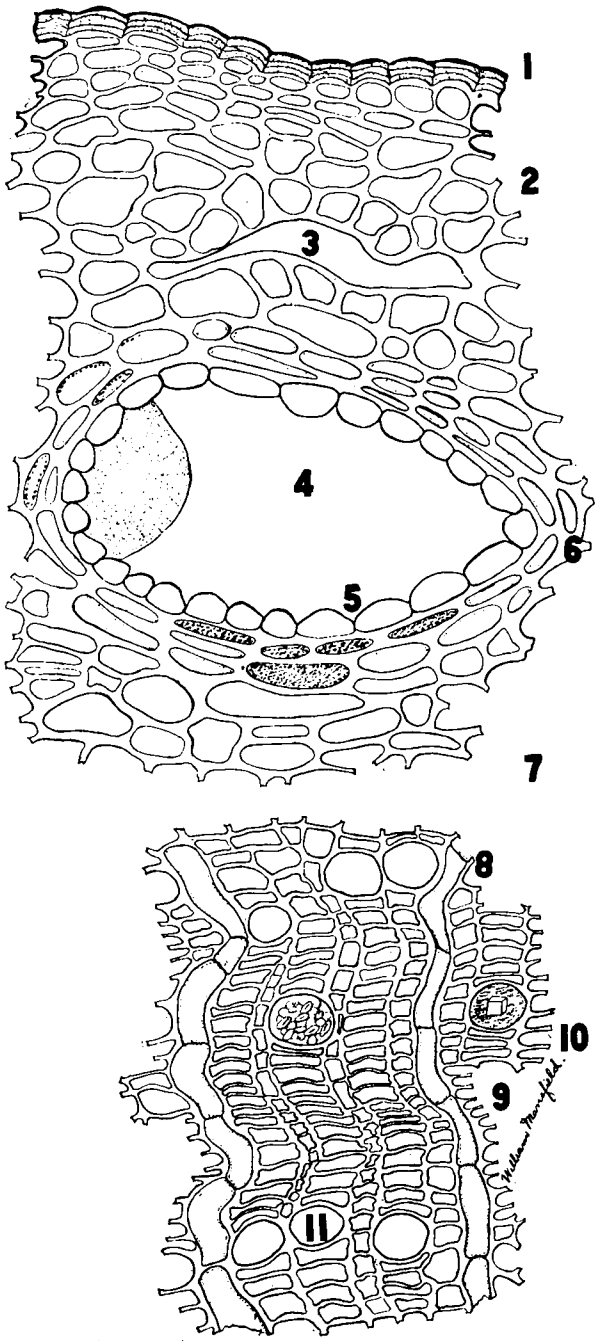

Chart I. Cross-section of Unrossed White Pine Bark.

1. Cork cells of the epidermis.
2. Parenchyma cells filled with chlorophyll.
3. Inter-cellular space.
4. Secretion cavity with resin.
5. Secretion cells.
6. One or more circles of parenchyma filled with chlorophyll.
7. Parenchyma.
8. Medullary rays.
9. } Sieve Cells.
10. }
11. Inner parenchyma cells filled with starch.

only place the evaporation of the oleo-resin can take place is at the edges or on the inner surface, where it usually occurs, owing to the ease with which it can traverse the medullary rays.

As there are no special tannin secretion cells, it would probably follow that a rossed bark would be as rich in tannin as the unrossed bark. If this is so, and it is only the tannin which is desired, in using it in the preparation of Syrup of White Pine Compound, then the rossed and unrossed bark would be equally good; the only advantage being in this case, a saving in the cost of labor, which is a very important item in making a drug commercially profitable. As the resin and tannin content of White Pine Bark is largely a chemistry problem, and just how much, if any, of the constituents enter into the final preparation, is a pharmacy problem, and by far the most important question concerns the therapeutics of Syrup of White Pine Compound: To what extent is its action due? What would be the effects on the system if the active constituents from all the drugs really enter into Syrup of White Pine Compound. The therapeutics of many of the U. S. P. and N. F. preparations offer a fertile field for study. It seem to me a line of investigation which is sadly neglected and which is absolutely necessary in order

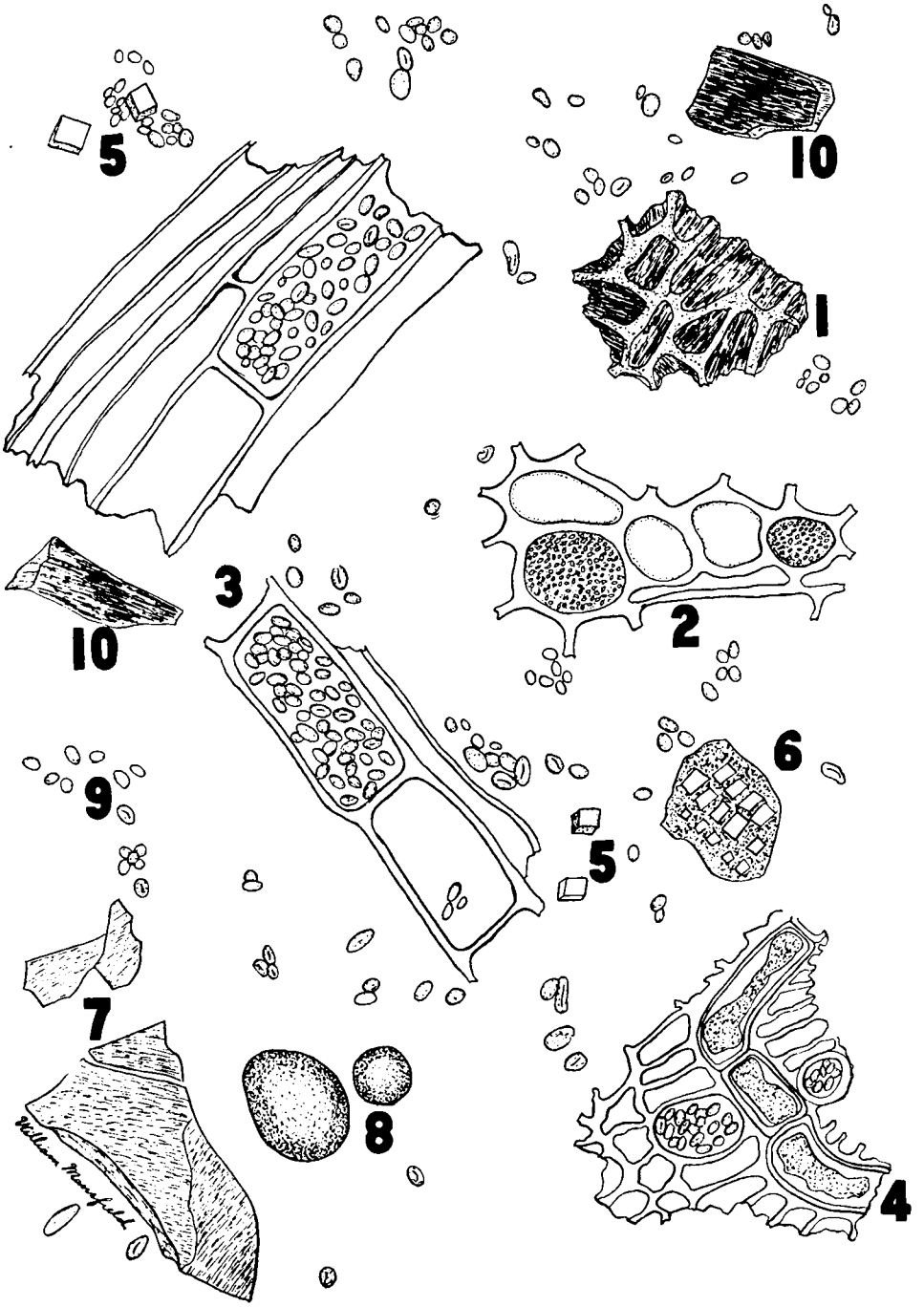

Chart II. Microscopic Elements of White Pine Bark.

1. Surface view of reddish-brown epidermis.
2. Outer transverse parenchyma filled with chlorophyll, and showing an inter-cellular space.
3. Longitudinal parenchyma filled with starch and sieve cells.
4. Transverse view of medullary rays with granular contents, inner cortical parenchyma with starch and sieve cells,
5. Cubical crystals.
6. Part of cell filled with cubical crystals.
7. Resin occurring in angled pieces in a water mount.
8. Globular masses of resin in an alcohol, glycerin and water mount.
9. Starch distributed throughout the field.
10. Reddish masses.

to complete and supplement the work of the chemist-pharmacist and pharmacognosist.

I will concern myself with the pharmacognosy of White Pine Bark. The cross section of the unrossed bark shows the following elements: Several layers of reddish-brown cork cells (1) very narrow, elongated and with thin walls. The outer parenchyma cells (2) vary greatly in size, form and thickness of the walls. The cells beneath the cork are small and often elongated, while those farther inward are often very large and frequently surround large elongated intercellular spaces (3). The secretion cavities (4) occur most abundantly in the middle bark, and the older the bark the larger the cavities. The secretion cells (5) immediately surrounding the secretion cavities are colorless and owing to the lack of pressure on their outer surface, the wall curves inward. Immediately surrounding these secretion cells are two or more rows of parenchyma cells (6) which are always packed with chlorophyll. Immediately inward from these, and extending to the beginning of the medullary rays are the parenchyma (7) which is usually free from chlorophyll, but contains the stored starch. The above elements are usually not found in white pine bark of commerce. The following elements are those which usually occur. The medullary rays (8) are greatly elongated cells and they constitute the wavy lines seen in the cross section. The sieve cells (9 and 10) seem to be of two general sizes, a nearly square cell and an elongated cell. In among the sieve tissues are found parenchyma cells which seem to go on growing even after the sieve cells have become dead and functionless. It is these cells which function as storage cells for crystals, starch, etc.

To a person familiar with the microscopic structure of a bark, there will be little difficulty experienced in identifying it and testing its purity. The epidermis (1) consists of reddish brown masses, irregular in outline. The outer parenchyma cells are of a bright green color owing to the presence of chlorophyll. (The above elements are not usually found in the rossed bark.) The parenchyma (3) with starch usually occurs in longitudinal sections accompanied with sieve cells. Often the tissue separates transversely, showing the medullary rays (4) with their granular cell contents (9) and the inner parenchyma cells filled with starch and the surrounding sieve cells.

The crystals are nearly perfect cubes and occur singly (5) or in groups (6). On the longitudinal section of the bark the crystals occur in parenchyma cells surrounded by a reddish cell content and form parallel rows which are very characteristic. The resin occurs either as white angled fragments (7) in a water mount, or as globular mass (8) or as reddish-brown pieces (10). The starch is very abundant and is distributed through the field. The diagnostic grain is lens-shaped, with a cleft hilum, which is nearly straight, or slightly curved and runs parallel to the long diameter of the grain. The addition of Ferric Chlorid T. S. will show the presence of Tannin, by forming a dark coloration. The identification of the starch is faciliated by the addition of a weak Lugols Solution, which imparts a blue coloration to the starch grain.

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