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ANATOMICAL EFFECTS OF WOOLLY APPLE APHID (ERIOSOMA LANIGERUM HAUS) IN THE APPLE TREE BRANCH

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***ABSTRACT**--For the first time in Uzbekistan, the anatomical structure of the apple tree trunk (five-star Apple variety) infected with apple blood aphids (Egiosoma lanigerum). And was studied anatomical features, and diagnostic signs characteristic of this variety were identified. When analyzing apples from the point of view of the anatomical structure of the stem of the five-star Apple variety, damaged and undamaged by blood aphids, it was found that biological substances are located in the secondary SAC of the stem parenchyma. When anatomical analysis of the Apple tree trunk damaged by Apple blood aphid, it was found that cells in the secondary parenchyma of the cerebral cortex died and as a result of damage in these tissues, new cells appeared (proliferation) and became tumors.such tumors were recognized as stem cancer and proved on the basis of the identified anatomical features used in the treatment and prevention of tumors of the parietal parenchyma of the Apple tree.*

***KEYWORDS**-- Apple blood aphid, Anatomical, Tree trunk.*

I. INTRODUCTION

Apple sap (Eriosoma lanigerum Haus), (Hemiptera: Aphididae), is the main pest of the apple tree (Malus domestica) worldwide. Its homeland is North America, and it thrives on apples and other trees throughout the year. Apple cider vinegar is a common dangerous pest of apples and causes potential destruction. Especially in the apple industry of the southern hemisphere, at the end of the last century, the apple industry was destroyed by this pest [10., 5]. In horticulture, apple juice is very difficult to manage due to its biology and protective mechanisms [11]. Nevertheless, the development of apple varieties and grafts that have genetic resistance to pests is one of the most important forms of protection. An important aspect of the selection program is to find new sources of resistance for the application of varieties based on resistant resistance [7]. These sap form colonies by settling on previously injured horns, twigs, and roots. It can also form colonies in undamaged (undamaged) areas [9., 11]. Apple juice is constantly distributed throughout the orchards, forming tumors in the affected and damaged areas [4]. It is devoted to the histochemical properties of apple tissue pathology as a result of damage, to the interpretation of the reaction of apple cells, to the dehydration of the tree cell shell and the formation of parenchymal tumors in the cambium layer. The most complete studies on the formation of tumors in apples were presented by Ad.Prillieux (1875 - 1877). Later I.Goethe (1909), V.Ehfer (1914), F. Zwelgelt (1916,1931,1943), K.Kuster (1925,1953), E.P. Venables

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(1929), p. Bdrner (1932), M.H. Crane, R.M. Greenslade, A.M. Maese, H.M. The research work of Tydeman (I936), F. Brahms lodt (1938), H. Wartenberg (1953), U. Jeanneau (1968,1969) and other scientists is also devoted to the study of apple tissue contaminated with apple juice.

However, none of them could reveal the nature of tumor formation and the induction of the mechanism. Many studies have been devoted to the formation of bacterial, viral, and genetic tumors (Terekhova N.A., 1956; BRAUN A.E., 1962).

As for tumors caused by sucking insects on the plant, little is known about this. Some authors explain the presence of growth-stimulating substances in the saliva of the pest, which causes tumors to appear after damage to the blood sap in the apple.

The anatomical and histological structure of the stem of a five-star apple variety infected and undamaged by apple juice has not been studied in Uzbekistan. The study of the stem of this variety shows the relevance and scientific novelty of our research.

The purpose of the study is to identify diagnostic signs and damaged tissues and cells based on the study of the anatomical and histological structure of the stem of five-star apple varieties infected and not damaged by apple juice in Uzbekistan.

The object and method of the study were five-star Malus domestica Mill apple varieties infested with blood sap (Eriosoma lanigerum) and fixed to 70^0 ethyl alcohol to study the anatomical structure of the stem. It was also fixed to the mixture in a 1:1:1 ratio (alcohol: glycerin: distilled water) in order to soften the stem. Anatomical and histological preparations were prepared by manual cutting method, bile was stained, glued with a mixture of glycerin-gelatin, and temporary preparations were prepared [1]. The anatomical and histological structure of the stem was studied on the basis of transverse incisions. The structure of basic tissues and cells K. Esau [2], It was described on the basis of the methods of N.S.Kiseleva[3]. The microphotos were taken using a computer microphotograph, a Sanon digital camera A123 and a *Motic B1-220A-3* microscope.

The study of the microscopic structure of apple seedlings artificially infested with sap in a laboratory setting showed that the size of the skin cells in the seedlings increased and a new cell appeared between them, which was found to be stem cancer. Based on all these results, a pathological process occurs in the formation of secondary cortical parenchyma of meristem tissue and the participation of low-molecular generations of lignin.

This means that apple blood juice has adapted to feeding on primary meristematic tissue, and only over a long period of evolution, due to the elongation of the cartilage and nipples of the juice, has there been a gradual adaptation to the secondary cortical parenchyma.

II. RESULTS AND DISCUSSION

The anatomical structure of the stem of an apple tree not damaged by blood sap (Eriosoma lanigerum). The stem is round in cross section, has a binding type, and is strongly woody. In terms of the anatomical structure of the stem, it is divided into three main zones - the periderm (foam), the secondary cortical parenchyma and the central cylinder (Fig. 1).

The periderm of the stem consists of three layers, consisting of phellogen, phellema, and phelloderma. Phellogen cells are rectangular in shape, extending in a radial direction and extending from the outside to the phelloma cells,

the phelloderma cells are thicker and rectangular in shape, clearly distinguishable from the inner cortical cells. The secondary cortical parenchyma is composed of round and oval-shaped cells that contain biological substances. The cells of the secondary cortical parenchyma are thin-walled, densely packed, and have intercellular spaces (Fig. 1).

Lub fibers are formed under the secondary cortical parenchyma. There is a phloem between the cortical parenchyma and the libriform. The stem is wooded due to the well-developed mechanical texture.

Most of the stem is occupied by libriform and is thin-walled. Between the libriform are 1-2 rows of radial rays, composed of long and short shaped cells. The central cylinder consists of numerous conductive ligaments and parenchymal cells. The primary conductive bonds in the stem are preserved until the end of the plant's vegetation. The xylem in the conductive ligament consists of thin-walled, large, small, and numerous tubes. The xylem tubes in the conductive ligament are round and oval in shape and are located radially (Fig. 1).

The central part of the stem consists of narrow, round and oval parenchymal cells. Parenchymal cells are thick-walled, including hydrocyte cells.

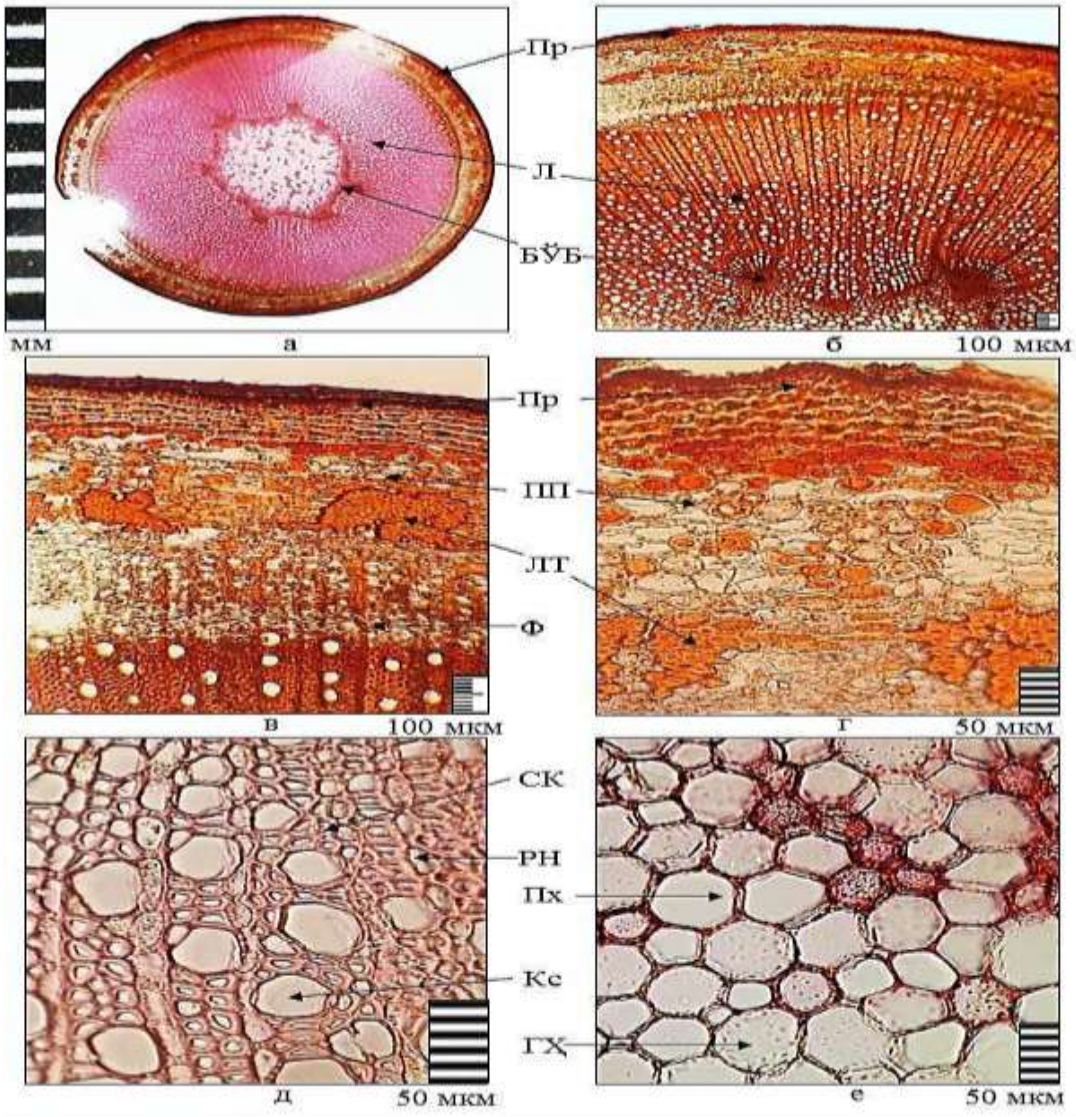

Figure 1: Anatomical structure of the stem of a five-star apple variety not affected by apple sap (*Eriosoma lanigerum*)**:** a - is the general appearance of the stem; b - detail; v-g - cortical parenchyma and lub fibers; d - libriform; e - core. **Symbols:** БЎБ - primary conductive bundle, ГХ - hydrocyte cell, Кс - xylem, Л - libriform,

ЛТ - lub fibers, ПП - cortical parenchyma, Пр - periderm; Пх - parenchyma, РН - radial rays, СК - sclerenchyma, Ф - phloem.

The anatomical structure of the stem of a five-star apple variety infested with apple blood juice (Eriosoma lanigerum). The stem has an oval shape, cross-sectional type in cross section. In terms of anatomical structure of the stem, it was divided into three main zones - periderm (foam), secondary cortical parenchyma and central cylinder, as well as the formation and development of tumors in the cortical parenchyma cells of the stem (Fig. 2).

The periderm of the stem consists of three layers, consisting of phellogen, phellema, and phelloderma. Phellogen cells are rectangular in shape, extending in a radial direction and extending from the outside to the phelloma cells, the phelloderma cells are thicker and rectangular in shape, clearly distinguishable from the inner cortical cells. The secondary cortical parenchyma consists of round and oval-shaped cells. Lub fibers are formed under the secondary cortical parenchyma. In addition, it was found that in the cortical tissues of the apple stalk contaminated with apple juice, the growth of tissues as a result of the growth of tumors i.e. proliferation i.e. the emergence and proliferation of new cells. As a result of the death and injury of cells in the secondary cortical parenchyma, the formation and proliferation of new cells and the growth of tissues into tumors, such tumors are called stem cancers. No such growths were observed in the woody part of the stem. Such tumors are mainly located between the cortical parenchyma of the stem and the libriform (Fig. 2). The stem is wooded due to the well-developed mechanical texture. Most of the stem is occupied by libriform and is thin-walled. Between the libriform are 1-2 rows of radial rays, composed of long and short shaped cells.

The central cylinder consists of numerous conductive ligaments and parenchymal cells. The primary conductive bonds in the stem are preserved until the end of the plant’s vegetation.

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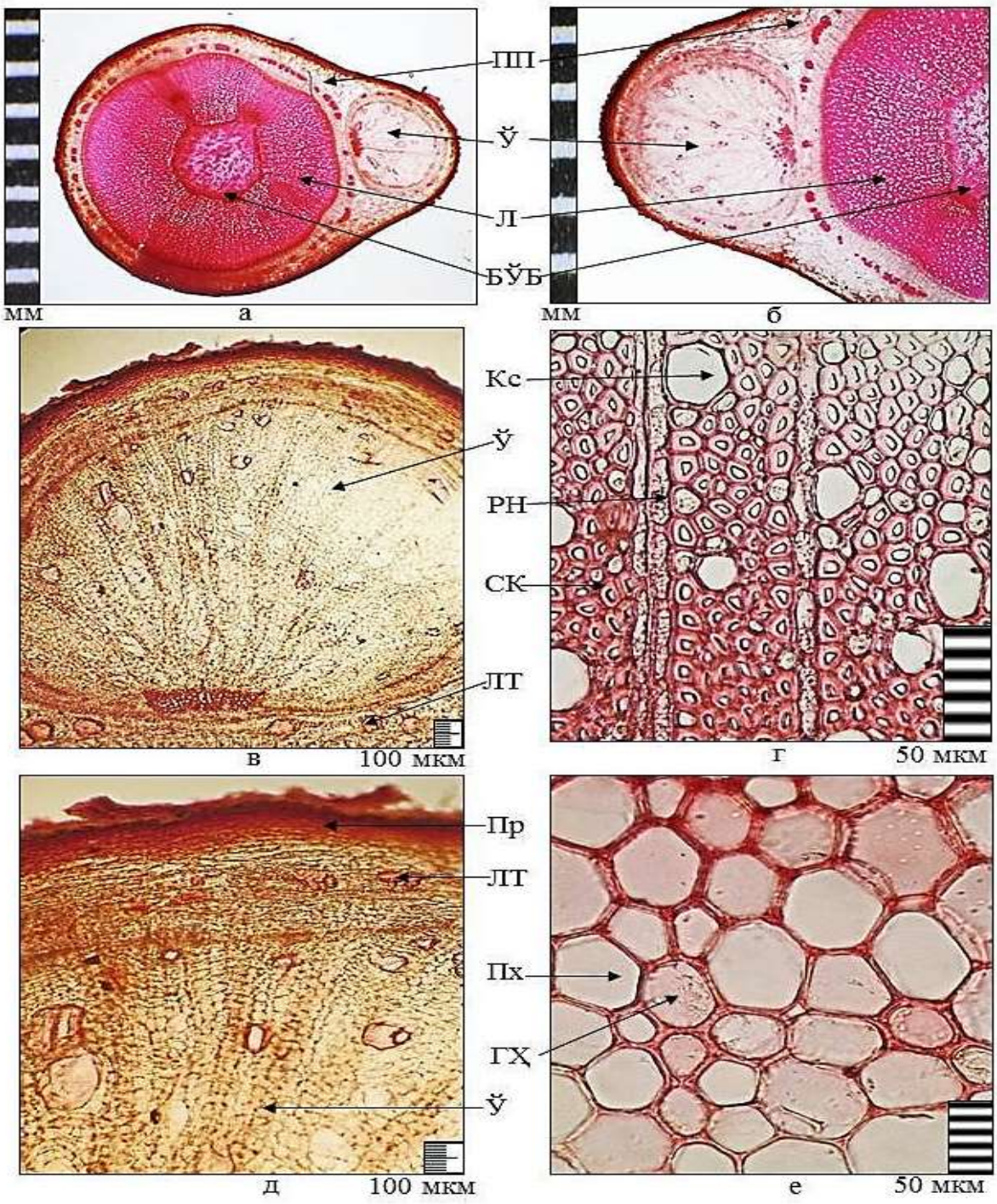

Figure 2: The anatomical structure of the stem of the five-star apple (Eriosoms lanigerum) variety infected with apple juice: а - general appearance of the stem; б - detail; в-д - tumor in the cortical parenchyma; г - libriform; е - core. **Symbols:** БЎБ - primary conductive bundle, ГХ - hydrocyte cell, Кс - xylem, Л - libriform, ЛТ - lub fibers, ПП - cortical parenchyma, Пр - periderm; Пх - parenchyma, РН - radial rays, СК - sclerenchyma, Ф - phloem, Ў - tumor.

The xylem in the conductive ligament consists of thin-walled, large, small, and numerous tubes. The xylem tubes in the conductive ligament are round and oval in shape and arranged radially.

The central part of the stem consists of narrow, round and oval parenchymal cells. Parenchymal cells are thick-walled, among which there are many hydrocyte cells (Fig. 2).

The dynamics of the pathological process caused by blood sap in apples shows that it occurs not in the woody part of the apple stem, but in the secondary cortex parenchyma and the complete destruction of the secondary cortex (cortex) synthesized by the cytoplasm. It is known that the secondary cortex (shell) is elongated, which is why the cortical parenchyma cells of tumors increase in size very rapidly.

These processes, apparently, depend on the composition and amount of lignin "Ф" and "М" present in the interior of the secondary cortical cells, causing the sap saliva to fall into the cell and depolmerize it. The accumulation of vanolin and pink aldehyde in the depolymerization product leads to the formation of tumors, which have only one function in the delignification process – the pathological process.

The presence of tumor-causing substances (in the cortex-coniferous and synapine alcohol) – the beginning of the pathological process and depolymerization products in the cortex - vanillin and pink aldehyde led us to the conclusion that tumor-forming substances are not present in the sap. Adaptation of the host-plant to the stimulants that grow young organs for apple blood juice is biologically more reasonable and reliable. This is evidenced by the ability of the wood itself to retain the growth-stimulating concentrate released during the delignification period. This is why the sap first adheres to the cortical part of the stem, following the process of early lignification of the tissues from the bottom up.

Based on the results of the study of the mechanism of damage to the tissues and cells of the stem and the induction of tumor formation in the vegetative organs of the apple, the following conclusions can be drawn:

1. The mechanism of infestation of apple twigs with sap is based on:

1.1. Syrup lancets are inserted primarily in places where more active growth processes are taking place - in the stem joints and leaf cracks of the branch;

1.2. The syringes prick the lancets into the secondary cortical parenchyma of the stem;

1.3. Syrup lancets pierce the cell intracellularly, i.e., directly through the cell membrane;

1.4. The tips of the lancets end in the inner layers of the secondary bark, or especially in the hardy varieties – the first cells in the core fibers of the woody part of the branch.

2. The following anatomical and structural changes occur at the puncture site:

2.1. Formation of secondary cortex and between these cells - the formation of periclinal parenchyma tumors;

2.2. Enlarged tumors lead to cracking of the bark, which in turn facilitates the damage of the branches by sap and leads to the destruction of the tumors by fungi;

2.3. With the development of tumors and differentiation of cells in the periclinal layer parenchyma (especially by autumn), primary conductive connections are formed;

2.4. Cytological, cytochemical and biochemical diagnoses are the basis for the assumption that tumor tissue is embryonic, because its characteristics are: the almost complete absence of substances of secondary origin, the specificity of the tissue, which is significantly differentiated by its presence; cells have only a primary (large amount of pectin) shell; tumors are composed of tissue and cells; characterized by intensive staining with nucleic acids in the initial period of tumor formation in parts of the cortex;

2.5. Tumors are formed in the bark parenchyma of the stem as a result of the feeding of apple blood sap on the stems under the influence of saliva;

2.6. Tumors are associated with the formation of bark parenchyma and deforestation of mature wood elements, a sharp change in the direction of biochemical processes in the bark cell to an increase in pH under the

influence of aphids, ie, changes in oxidation-reduction processes (oxidation decreases and reduction reaction predominates).

3. The induction of the mechanism of tumor formation caused by blood juice in apples has been identified. The sap adapts at the earliest stage of lignin synthesis, which has meristematic and highly biosynthetic properties in cortical tissue, due to its deep adaptation to a certain ontogenetic state of host-plant tissue.

Saliva of sap reduces the synthesis of lignin by reversing the direction of oxidation-reduction processes in the bark of the stem, resulting in the accumulation of low-molecular-weight lignin precursors in the bark cells that trigger tumor growth.

Due to the synthesis of cortical tissue, the continuation of the pathology is manifested in the delignification (depolymerization) of the lignified secondary cortical tissue cortex. In delignification, precursors of lignin, which promotes pathological growth of cortical cells, accumulate.

III. CONCLUSION.

In other words, for the first time in Uzbekistan, the anatomical structure of the stem of a five-star apple variety infected and not damaged by apple blood juice (Eriosoma lanigerum) was studied, and specific diagnostic features of this navigator were identified. When analyzing the anatomical structure of the stem of a five-star apple variety infected and undamaged with apple juice, it was found that the biological substances in the damaged and undamaged apple variety are located in the secondary cortical parenchyma of the stem. Thus, tumors grow due to hyperplasia and hypertrophy of cortical cells. Growth is called by low-molecular-weight generations of lignin. The sap does not contain tumor-forming substances because it is more biologically based on the adaptation to the organs of the young plant-host, which is specific for tumor-forming organisms. detected. These identified anatomical features are used in the treatment and prevention of tumors in the skin parenchyma of apples.

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