

**SAP EXUDATION PHENOMENA  
OF THE ELM TREE. A  
THESIS SUBMITTED FOR THE  
DEGREE OF MASTER OF ARTS**

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Sap Exudation Phenomena of the Elm Tree. A Thesis Submitted for the Degree of Master of Arts  
by Milton Clarence Gugler

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**MILTON CLARENCE GUGLER**

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MILTON CLARENCE GUGLER

A THESIS SUBMITTED FOR THE DEGREE OF

MASTER OF ARTS

UNIVERSITY OF WISCONSIN  
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**THESIS**

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## I. INTRODUCTION

The phenomenon of excreting liquid water is widely distributed in the plant kingdom and may occur either from uninjured or from injured parts of plants as in the bleeding of cut stems. In the former case the water escapes as the result of the activity of glands, through stomata, or through other openings. Both bleeding and secretion of water is due to activities of living cells. There may be special groups of cells in the leaves or flowers which produce these secretions. This power of secretion is not confined to the higher plants. Various types of mosses, fungi, and even algae may also possess the power of exuding sap.

The process of exudation is probably not brought about in all cases in the same manner. The excretion of water, except in nectaries, is due not to the presence of dissolved substance outside the cell but to internal causes brought about by the activities of living protoplasm, the process being one of active excretion, active exudation, or filtration under pressure. According to Haberlandt (22), we have in the case of nectaries plasmolytic excretions due to the presence of sugar outside the cell. This type of excretion can be brought about and continued when the cell is flaccid while the other cases of excretion can only take place when cells are turgid. In both cases the osmotic powers of living cells are involved. Water may be forced