

## PRESENT STATUS OF THE CLASSIFICATION OF IMMATURE INSECTS<sup>1</sup>

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### INTRODUCTION

The present day knowledge of immature insects is incomplete and fragmentary as compared to the information that is available concerning adult insects. The study of immature insects has been neglected, but is of great biological interest because a knowledge of the preparatory stages of insects is essential to an understanding of the many adaptations of insects, whose significance can only be recognized when light is thrown on the immature stages. Comparative studies of immature forms will yield light on the significance of metamorphosis, especially as to the origin and development of this phenomenon which appears in its greatest development in the specialized insects. Certain adaptations of immature insects when fully understood should aid in the application of the biogenetic law to insects and all attempts to correlate insect ontogeny with phylogeny must give careful consideration to the characteristics and peculiarities of postembryonic development. It seems hardly necessary to stress the importance of the study of immature insects. They afford numerous aids in the study of phylogeny and classification when study of the adults fails to furnish the necessary evidence. Moreover, larvae are of great interest because of their habits which furnish abundant material for the study of insect ecology, a much neglected field.

Not only have the structural and functional modifications of immature insects been neglected but the taxonomic aspect is in a deplorable state and there is at present a crying need among the economic investigators for a way out of the present chaos. There is scarcely an economic entomologist but what has dire need for a system of classification of immature insects. To be sure, some work has been accomplished but what little has been done is scattered widely in the ever increasing flood of entomological literature. No attempt has ever been

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made to bring together the known facts of larval and nymphal development and not even a bibliography on the whole subject is available.

The present paper is an attempt to bring together some of the materials for the classification of immature insects; the important facts of metamorphosis and some structural characteristics are considered, and some available keys to the immature stages of insects are listed in the hope that others will strive for a further advancement in the classification of immature insects.

#### PRESENT STATUS OF CLASSIFICATION

Most of the earlier students of entomology devoted their efforts to the study of adult insects, stressing at first the classification, and later, the morphology of mature insects. A few workers such as Swammerdam and Reaumur devoted their attention to the metamorphosis and habits of insects. Led by the great Linnaeus, the vast majority of the students of taxonomy, even up to the present day, have confined their attention to the classification of adult insects. Through their efforts new species are being defined and a limited number of descriptions of the egg, larval, and pupal stages are being compiled. These descriptions have been augmented in recent years by the increased interest in economic entomology which is especially evidenced in the United States, as well as some foreign countries, and by the establishment and development of numerous federal and state agencies for the study of insect life. These laboratories have expended a large share of their efforts in making known a vast number of our economically important insects and fortunately the work is still progressing. In spite of the fact that our knowledge of the immature stages of insects is rapidly increasing, it has by no means kept pace with the advance made in the study of adult forms. The available information is scattered widely in the literature and until some effort is made to assemble the present known facts, progress will be slow.

Perhaps the best known groups of immature insects are the Lepidoptera and certain members of several insect orders which are generally referred to under the group term "aquatic insects". The students of Lepidoptera have been among the foremost in advancing the study from the systematic standpoint. This can be explained, in part at least, by the unexcelled beauty of the adults which has led many collectors to rear and study the immature stages, in many cases merely to obtain more adult specimens. It must not be forgotten, however, that many students have been impelled by a desire to know more about the immature insects.











































