

METHOD OF FEEDING BY HOLOMAS TIGID FLAGELLATES SYMBIOTIC IN XYLOPHAGOUS TERMITES

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ABSTRACT

The process of ingestion and digestion of the Holomastigid flagellates symbiotic in the digestive tract of xylophagous termites is hitherto unknown. In this paper the process studied in two species of flagellates, viz. *Holomastigotoides* sp. and *Spirotrichonympha* sp. from termites is presented.

INTRODUCTION

The symbiotic flagellates of the alimentary tract of xylophagous termites represent an interesting faunal association. In the feeding habit of these flagellates we find a great diversity as it is also found in other features of their life history. The flagellates abundant both in form and number filling the alimentary canal of the termites, ingest and digest the wood which is taken by the incumbent.

The total weight of all the protozoa present in a termite worker has been estimated to be from about 1/7—1/4 (Hungate, 1939) or 1/3 (Katzin and Kirby, 1939) to as much as 1/2 (Cleveland 1925) of the body weight of the termite. The method of food ingestion especially in Trichonymphid flagellates was studied by Swezy (1923) and Cleveland (1923a, 23b, 25). Nothing is known on feeding habit of Holomastigid flagellates, therefore the present work is brought forward.

MATERIAL AND METHODS

The specimens belonging to the genera *Holomastigotoides* and *Spirotrichonympha* were collected from Calcutta and its environs from *Coptotermes heimi* (Wasm.) and *Heterotermes indicola* (Wasm.) while dealing with the studies on symbionts of termites. For observation larger termites were selected in which the abdomens were somewhat swollen. The entire intestinal tract was removed and placed on a slide. The wall of the intestine was carefully opened and spread apart. The fresh smears of gut contents were mixed with very little quantity of 0.5% saline. The nature of food ingestion was observed under 10×40 magnification of the C. Z. microscope. The specimens were fixed in Schaudinn's fluid and stained in iron haematoxylin time to time. The figures were drawn with the help of camera lucida.

THE METHOD OF FEEDING

The pseudopodial method of feeding was

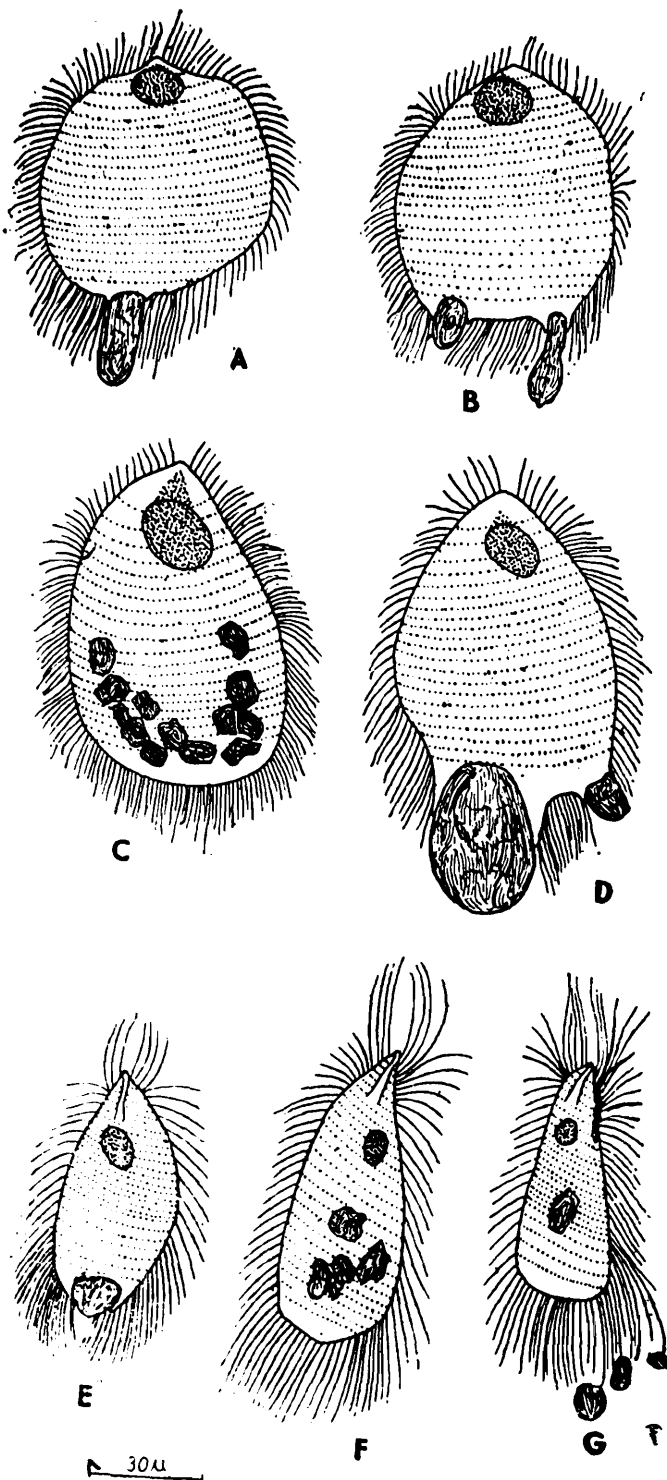


Fig. 1. A—The food particles adhering to the flagella at posterior end of the *Holomastigotoides* sp. B—Two small pseudopods approach on either side of the food particle and circling it, C—The individual shows fully engulfed food particles, D—The individual is showing ingestion of a large piece of wood, E—The food particles are entangled in the flagella at the posterior end in *Spirotrichonympha* sp. F—The two pseudopods forming a cup around the food particle, G—The individual shows engulfed food particles at posterior end,

observed. *Holomastigotoides* sp. equipped with numerous flagella but the flagella do not take any part in the capture of food particles except when the food particles are entangled with them (Fig. 1A) are easily captured. The pseudopodia are generally formed from the posterior portion of the body where the flagella are absent. Two small pseudopodia of clear ectoplasm approach on either side of the wood particle (Fig. 1B). The pseudopodia continue further gradually forming a ring around the particle and draw it inside the body ultimately both ends of the pseudopodia come in contact with each and the food is completely ingested by the symbiont. The maximum size of the food particle measures $30.15 \times 26.96 \mu$ (Fig. 1D). In this way the entire body of the symbiont was almost filled up with the wooden particles (Fig. 1C). The act of engulfing one piece does not prevent in capturing a second simultaneously by other parts of the body. The particles in different degrees of digestion is indicated by the different grades of the food particles inside the body.

The process of feeding in *Spirotrichonympha* sp. is somewhat similar to that of *Holomastigotoides* sp. as described above. The posterior portion becoming wider almost ball-shaped and long flagella present over there extend backward with their tips interlocking (Fig. 1E). The food particles when come in contact to the body of that region from the under surface, one or more pseudopods are formed. The ectoplasm expands locally accompanied by flow of endoplasm. Immediately the marginal surface from this expanded cytoplasm become firmly attached to the food particle and the closed area arched upwards thereby the endoplasm between the upper and the lower surface of the pseudopodia recede forming a cuplike cavity (Fig. 1F). The rim or periphery of this concavity was slowly drawn from all direction

reducing to an aperture first and later it completely closed. The food particle is now engulfed (Fig. 1G). The maximum size of wood chips measures $13.12 \times 11.15 \mu$.

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