INTRODUCTION

Insect epidermal cells derived from ektoderm, are involved in the main physiological functions. They are covered by a continuous secretion: the cuticle. The epidermal cell layer and the cuticle constitute the integument, the function of which is much more important than that of the skin of other animals. In fact the integument has to be considered as a skin, a skeleton and also a food reserve. Epidermal cells have a cyclic activity related to the molt/intermolt cycle. During this cycle many changes occur which affects for instance the shape of the cells, the cohesion between the cuticle and epidermal cells beneath it, or enzymatic activities. Since very good reviews were recently published on these aspects of epidermal cell activity, we focus our study on the relation between epidermal cell activity and chitin synthesis. High concentrations of chitin are located in insect cuticle; also, several authors suggested that chitin synthesis could be considered as a very specific target for potential insecticides. Such compounds as benzoylphenylureas have been reported to be chitin synthesis inhibitors. We developed in our laboratory the available methods of chitin detection to evaluate ability of epidermal cells to synthesize chitin.

IN VIVO OBSERVATION OF STRUCTURES CONTAINING CHITIN

Several techniques were developed to detect chitin directly on thin cross sections of integument. We demonstrated that chitin can be located by incubation with FITC-WGA and observation by fluorescence microscopy. To prevent interferences with GlcNAc-rich-glycoproteins, integuments were digested by hot concentrated alkali that induce a partial deacetylation, then washed with buffer and incubated with FITC-WGA. The affinity of WGA with N-acetylglucosamine had also been used to demonstrate the presence of chitin by electron microscopy. Simultaneously electron microscopy reveals the specific pattern of fibrillar structure resulting from chitin-protein association (Fig.1). However tissue as imaginal wing discs produce material that has not the usual oriented arrangement of chitin rods (Fig.2). Absence of such arrangement was also observed in scales (Fig.3). Entire tissues (integument, imaginal wing discs, entire adult wings covered with scales) were heated in saturated aqueous potassium hydroxide at 120°C for 6 h. After cooling the remaining structure was washed until
Fig. 1-3. Electron micrographs of section of epidermal cell secretions in which chitin material was detected.
1-cuticle deposition by integument epidermal cells.
2-Apical face of imaginal wing disc cells.
3-Section of flattened scale.
ec: epidermal cells; cm: chitin detected material.

Fig. 4. Electron micrograph of section of integument after treatment with Diflubenzuron. Cl: Chitin like material, dg: dense granules.