The chemical structures of three homologous insect juvenile hormones have been determined. We have studied the biosynthesis of the early intermediates of the metabolic pathway to juvenile hormones II and III using enzyme systems from corpora allata (CA) of the tobacco hornworm, Manduca sexta. Incubation of CA cytosolic enzyme 1 (C) in the absence of NADPH led to formation of 3-hydroxy-3-methylglutaryl-1-CoA (MEG-CoA). Incubation of the same substrates with CA cytosolic and microsomal enzymes in the presence of NADPH and other intermediates demonstrated to have the 3β absolute configuration. Both the latter and NADH-COA exchanges were known to have the 3β absolute configuration. Details of the proof of structure and stereochemistry will be presented. These studies demonstrate the biosynthesis of CA CoA and homologous esters.

We also studied the reduction of 3β-[1-14C]MEG-CoA and 3β-[1-14C]HMG-CoA by CA enzymes. Both substrates are efficiently reduced, but HMG-CoA is preferred. Substrate isomerase activity in the CA of Drosophila melanogaster shows that the reduction is stereospecific.

We intend to investigate the possible importance of these enzymatic processes in regulating the ratios of the three JHs biosynthesized in various life stages of selected insect species.

63. RECENT STUDIES OF INSECT JUVENILE HORMONES. Earl R. Bame, Martin G. Peter, Paul B. Smith, Theresa S. Gao, Gunther Herich, Govindan Basakaran and Herbert Röller, Institute of Developmental Biology, Texas A&M University, College Station, TX 77843.

Normal juvenile hormone (JH) systems are compared with the deviant ones of H. oecophylla and M. sexta black larval mutant in order to elucidate mechanisms for the regulation of JH titers on the biochemical level. All postulated intermediates in the bio-synthetic pathway of JHs are accumulated in cultures of corpora allata (c.a.) of larval and adult insects after application of radiolabeled precursors not more complicated than acetate or methionine. The synthesis is largely enhanced in both cases when the JH titers are increased in aging flies, and normal development is delayed.

The synthetic enzyme is found in the male accessory sex gland (MAG) by a specific method. The enzyme is first detectable in MAG homogenates in days 15-16 of adult life and is able to methylate injected 20-23 hours after injection.

The prepubescent male is transplanted into a female pupa and results in an adult male that contains a male reproductive tract. This procedure in combination with c.a. transplantation and other surgical procedures allows experimental separation of pheromones due to the corpora allata, the MAG, and their male or female environment in the developing oecophylla moth.