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CHARACTERISTICS OF *G. MELLONELLA* MICROBIOME AND THE POSSIBILITIES OF ITS USE IN BIOTECHNOLOGY

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In recent decades, a few novels therapeutic have been discovered and today humanity faced with antimicrobial resistance of microorganisms leading to global health crisis. Novel antimicrobials are needed to counter resistance. Unfortunately, no new classes of therapeutics had been clinically approved over three decades [1].

Antimicrobial therapeutics often is obtained from natural products and organisms. Natural ecosystems and organisms involved in ecological interactions between each other are on the language of microbial interactions evolved to mediate cooperation or antagonism among and between different species. Exploration the interactions between microbial communities can help us understand the ecology and diversity of natural products that can be used for further invention of novel therapeutics.

Evidence of antimicrobial properties of insects had been investigated by Marc et al [2].The distinct evolutionary lineages investigation of *Streptomyces* from insect microbiomes is founded to be the source of new antimicrobials through large-scale isolations, bioactivity assays, genomics, metabolomics and *in vivo* infection models. According to the article, new molecule active against multidrug resistant fungal pathogens had been described.

New antimicrobial and antifungal therapeutics can be obtained through investigation ecological interactions. Gu et al. discovered that commercially available strain *Bacillus amyloliquefaciens* FZB42 showed strong activity against *F. graminearum*. *Fusarium graminearum* is a destructive fungal pathogen that threatens the production and quality of wheat and barley worldwide by causing *Fusarium* head blight (FHB). *F. graminearum* can produce several mycotoxins, such as deoxynivalenol (DON) and zearalenone, in infested grains. These metabolites represent a significant threat to the health of animals. Despite the large economic and health impacts of FHB, no highly resistant varieties of wheat or barley are available. The lipopeptide bacillomycin D, produced by FZB42, was shown to contribute to the antifungal activity. Purified bacillomycin D showed strong activity against F. graminearum, and its 50% effective concentration was determined to be approximately 30 g/ml. Analyses using scanning and transmission electron microscopy revealed that bacillomycin D caused morphological changes in the plasma membranes and cell walls of *F. graminearum* hyphae and conidia [3].

For the past two decades, microbiologists have sought alternatives to mammals for studying the molecular basis of virulence and for testing antimicrobial drugs. Tsai et al. reviewed the extensive body of literature which reports the value of *Galleria mellonella* (Greater wax moth) larvae as a model for investigating bacterial pathogens. The authors highlight many of the attractive features of this model: when compared with mammals, *G. mellonella* larvae are cheaper and easier to maintain, they do not require specialized laboratories or equipment and work with *G. mellonella* does not require ethical approval. Unlike many alternative models *G. mellonella* can be maintained at 37^{o}C. It can be an important feature of this model is the ease with which the larvae can be injected with precise doses of pathogen, allowing the relative virulence of strains and mutants to be compared [4].

In a limited number of studies done by Péchy-Tarr M. et al. showed that preparations from either bacteria or fungi that have been injected into *G. mellonella* to study their toxicity were less virulent to the larvae. In many cases, the toxins studied are known to be insecticidal and *G. mellonella* larvae provide a good model to further investigate toxicity [5].

Wojda et al. made researches describing that insects possess anatomical and physiological barriers, protecting them against invasion by microorganisms. The insect body cover is composed of a single layer of epithelium, which rests on the basal membrane. The epithelium is involved in the structure of the cuticle, which is composed from chitin. This hardened insect body cover protects against mechanical injury and infection. Similarly, the insect trachea possesses chitin padding which hardens with age. Additionally, the low humidity and lack of nutrients inside the trachea create the unfavorable conditions for colonization by microorganisms. Insects are prevented against infection via the oral route by the structure of the gut. The foregut and hindgut have a lining of chitin. The biochemical conditions in the gut, such as pH and digestive enzymes, are not friendly for development of intruders [6].

The scientific research is based on studying of the *Galleria mellonella* larvae gut microflorato determine microbiome species composition and the possibility of its use in biotechnology.

Cultivation of gut microorganisms held according to classical microbiology methods. Species identification was carried out using molecular genetics. As a result, *Galleria mellonella* microbiome consists of the following microorganisms: *Bacillus amyloliquefaciens, Pseudomonas spp., Bacillus velezensis, Rhizobium spp., Bacillus subtilis.*

More detailed studies of *Galleria mellonella* gut microbiome and possible useful properties of microorganisms in biotechnology need further investigations.

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