

## **KEANEKARAGAMAN BAKTERI SIMBION PADA *Aedes aegypti* (Linn.) DAN PENGARUHNYA TERHADAP PERKEMBANGAN LARVA**

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### **INTISARI**

Beberapa jenis bakteri merupakan flora normal pada alat pencernaan dan berinteraksi dengan bagian dalam tubuh nyamuk sebagai simbion. Bakteri simbion berperan penting dan berpotensi membantu pencernaan serta menyediakan senyawa bagi pertumbuhan nyamuk dan mengubah perilaku inang. *Aedes aegypti* merupakan jenis nyamuk vektor virus dengue, menimbulkan wabah di daerah tropis. Permasalahan yang timbul adalah bakteri apa saja yang berinteraksi dengan tubuh bagian dalam *Ae. aegypti* sebagai simbion; bagaimana aktivitas dan pengaruh bakteri tersebut terhadap perkembangan larva *Ae. aegypti*. Penelitian bertujuan menganalisis keanekaragaman bakteri simbion pada tubuh bagian dalam *Ae. aegypti*, menguji aktivitas antimikrobia bakteri isolat terhadap mikrobia patogen, mengobservasi pengaruh bakteri isolat terhadap perkembangan larva *Ae. aegypti* dan mengidentifikasi isolat berdasarkan sifat dan karakter fisiologi. Penelitian difokuskan pada karakterisasi bakteri yang dapat dikulturkan. Penelitian lapangan berupa pengambilan spesimen larva *Ae. aegypti* dilakukan di area terjangkau demam berdarah (Mergangsan dan Depok, Yogyakarta). Penelitian laboratorium meliputi: 1) Pemeliharaan dan perbanyakan *Ae. aegypti*, 2) Isolasi bakteri simbion *Ae. aegypti*, 3) Uji aktivitas antimikrobia isolat terhadap mikrobia model, 4) Uji pengaruh bakteri simbion terhadap perkembangan larva *Ae. aegypti*, 5) Identifikasi bakteri berdasarkan karakter morfologi, biokimia dan fisiologi. Sterilisasi *Ae. aegypti* menggunakan disinfektan: formaldehid 37%, ethanol 96%, dan akuades steril; kemudian dihancurkan dan disuspensikan pada buffer fosfat pH: 7,2. Isolasi bakteri simbion dilakukan melalui pengenceran seri, ditanam (taburan) pada medium *nutrient agar* diperkaya ekstrak *Ae. aegypti*. Koloni bakteri berbeda dan tumbuh terpisah ditransfer ke medium yang sama. Kemampuan tumbuh isolat pada medium cair diuji aktivitas antimikrobiana serta sebagai inokulum untuk menguji pengaruhnya terhadap perkembangan larva. Identifikasi bakteri berdasarkan karakter morfologi koloni, pengecatan Gram, sifat fisiologi dan biokimia. Uji pengaruh bakteri pada larva dilakukan dengan menginokulasi bakteri dari media NB (sebanyak 0.25; 0.5; 0.75; 1; dan 1.25 ml) ke dalam 250 ml akuades steril berisi 25 larva *Ae. aegypti*. Sepuluh tipe bakteri berhasil diisolasi dari *Ae. aegypti*, terdiri dari *Bacillus* (strain BAE-A1, BAE-B3, dan BAE-B4); *Staphylococcus* (strain BAE-A2 dan BAE-A5); *Streptococcus* (strain BAE-B5), gram negatif *coccus* (strain BAE-A3 dan BAE-A4), *Bacteroides* (strain BAE-B1), dan *Enterobacter* (strain BAE-B2). Empat isolat memiliki aktivitas antimikrobia. Strain BAE-A1 memiliki aktivitas antibakteri tertinggi dengan spektrum luas, mampu menghambat pertumbuhan *S. aureus* (3,7 mm) dan *E. coli* (3,8 mm); sedangkan isolat strain BAE-A2, BAE-A4, dan BAE-A5 hanya menghambat pertumbuhan *E. coli* dengan diameter penghambatan berturut-turut: 3.85; 1.7; dan 3,3 mm. Strain BAE-A2 memiliki aktivitas penghambatan dan mortalitas larva tertinggi, sedangkan strain BAE-A1 memiliki aktivitas penghambatan dan mortalitas larva terendah.

**Kata Kunci:** Bakteri simbion, interaksi simbiotik, larva *Aedes aegypti*

## **BACTERIAL SYMBIONT DIVERSITY ON *Aedes aegypti* (Linn.) AND THEIR EFFECTS TO LARVAE DEVELOPMENT**

### **ABSTRACT**

Several types of bacteria are normal flora on gut and interact with their host as a symbiont. Bacterial symbionts have an important role and potential function on digestion or providing substance required for mosquito growth and host behavioral changes. *Aedes aegypti* is mosquitoes vector of dengue virus, in the tropics. The problems of research were which bacteria residing on and interacting with the inner body of *Ae. aegypti* as symbiont; and what the bacterial characteristics and their roles associated with larvae development. The aims of the study were to analyze the diversity of bacteria as symbiont of inner body of *Ae. aegypti*, to elucidate the antimicrobial activities of bacterial isolate towards microbial pathogens, to observed the effects of bacterial isolates on larvae development, and bacterial identification based on biochemical and physiological characteristics. Research included field work to collect the larvae and imago specimen of *Ae. aegypti*, conducted on endemic area of dengue fever; i.e Mergangsan and Depok, Yogyakarta; Laboratory works covered: 1) Cultivation through rearing of *Ae. aegypti*, 2) Isolation bacteria as symbionts of *Ae. aegypti*, 3) Elucidation of bacterial isolate on antimicrobial activities against microbial model, 4) Analyzing the influence of bacterial isolates on development of *Ae. aegypti* larvae, 5) Bacterial isolates identification based on morphological, biochemical, and physiological characteristics. Bacteria was isolated from *Ae. aegypti*, aseptically sterilized with 37% formaldehyde, 96% ethanol, and sterile water. The mosquitoes were then crushed in and suspended with phosphate buffer pH: 7,2. Bacterial isolation was carried out through serial dilutions and planted (pour plate) on nutrient agar medium containing an extract of mosquitoes, incubated on room temperature. All bacterial colonies growing separately and having different performance were picked up and transferred onto the slant medium. The isolates were selected based on their ability to grow on the liquid medium and then screened for their antimicrobial activity and used as inoculums to test their effects on larvae development. Identification of bacterial isolates based on the morphological colonies, Gram staining, physiological and biochemical properties. Bacterial isolate activity test on larvae were done by inoculating bacterial suspension from NB media (0.25; 0.5; 0.75; 1; and 1.25 ml) into 250 ml sterile aquadest filled with 25 larvae of *Ae. aegypti* in a bottle. Ten types of bacteria had been isolated from *Ae.aegypti*, consist of *Bacillus* (strain BAE-A1, BAE-B3, and BAE-B4); *Staphylococcus* (strain BAE-A2 and BAE-A5); *Streptococcus* (strain BAE-B5); gram-negative coccus bacteria (strain BAE-A3 and BAE-A4), *Bacteroides* (strain BAE-B1), and *Enterobacter* (strain BAE-B2). Four isolates had antibacterial activity. Strain BAE-A1 had the highest inhibition zone with broad-spectrum of antibacterial activity; able to inhibit *S. aureus* (3,7 mm) and *E. coli* (3,8 mm); while the isolate BAE-A2, BAE-A4, and BAE-A5 were only inhibit *E. coli* (narrow spectrum) with diameter of inhibition zone: 3.85; 1.7; and 3.3 mm, respectively. The experimental results of bacterial inhibition towards larvae of *Ae. aegypti* showed that strain BAE-A2 had the highest larval inhibition and mortality, while strain BAE-A1 had the lowest larval inhibition and mortality.

**Keywords:** symbiont bacteria, symbiotic interactions, *Aedes aegypti* larva



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