INSECTICIDE RESISTANCE, MECHANISMS, AND GENE FLOW IN *CULEX QUINQUEFASCIATUS* FROM WEST AFRICA.

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Larval susceptibility to organophosphates (OP), carbamates (CARB) and pyrethroids (PYR) was investigated in *Culex quinquefasciatus* from Côte d'Ivoire and Burkina Faso. A total of 33 populations collected in 25 cities were tested. The resistance of these natural field populations was compared to a susceptible reference strain under the same conditions.

In Côte d'Ivoire, populations showed a heterogeneous response to OP and CARB. A range of 40%-98% of larvae had a low resistance level to both chlorpyrifos (2-8x) and propoxur (1-4x). The remaining 2% to 60% of larvae displayed a high level of cross-resistance between chlorpyrifos (15-30x) and propoxur (>700x). Biochemical studies showed that low level resistance to OP was due to A2-B2 overproduced esterases and that cross-resistance to OP and CARB was conferred by an insensitive acetylcholinesterase (AChE). This AChE provided a lower resistance to temephos (10x). In Burkina Faso, populations were slightly resistant to OP (1-3x) and not to CARB. The esterases A2-B2 were only present at 50% frequency.

In contrast, PYR-resistance was similar between the two countries. All populations were resistant to either permethrin (20-80x) and deltamethrin (15-40x). Bioassays using piperonyl butoxide (PB) and biochemical studies showed that PYR-resistance involved increased metabolism by mixed function oxidases. Knowing that synergism of PB did not completely suppress resistance and that adults did not show a knockdown effect with high permethrin concentrations, it is likely that PYR-resistance was also due to a Kdr gene.

In order to understand the spread of resistance genes, attempts were made to evaluate the level of gene flow among populations using electrophoretic polymorphism of "neutral genes". Preliminary results tend to show that genetic differentiation among samples was very low, and (using Wright's F-statistics) a high number of migrants were found among populations even located several hundred kilometres away. This conclusion is based on two hypotheses. Firstly, colonization by *C. quinquefasciatus* of most cities in West Africa occurred recently (less than the 50 years), by increasing urbanization. Secondly the exchange of adults among populations is high, most likely due to passive transportation. The ability of adults of the *C. pipiens* complex to migrate is well documented and this migration is responsible for the worldwide spread of A2-B2 esterases.

Without a significant reduction of nuisance, any malaria vector control operation in urban areas will be regarded by local inhabitants as ineffective. However controlling Culex, the main cause of nuisance, will be increasingly difficult to achieve because of pyrethroid resistance.

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