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SHORT COMMUNICATION

First report of the oriental mosquito *Aedes albopictus* on the West African island of Bioko, Equatorial Guinea

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Abstract. The invasive oriental mosquito *Aedes (Stegomyia) albopictus* (Skuse) (Diptera: Culicidae) was detected on Bioko Island for the first time in November 2001. It was found to be well established breeding in artificial containers at Planta, near Malabo, the capital of Equatorial Guinea. Associated species of mosquito larvae were *Aedes aegypti* (L.), *Ae. africanus* (Theobald), *Culex* near *decens* Theobald, *Cx. duttoni* Theobald, *Cx. quinquefasciatus* Say, *Cx. tigripes* De Grandpré & De Charmoy, *Eretmapodites quinquevittatus* Theobald and *Mansonia africana* (Theobald). This is the third tropical African country to be invaded by *Ae. albopictus*, which has recently spread to many parts of the Americas and Europe – with vector competence for dengue, yellow fever and other arboviruses. In the Afrotropical environment, it will be interesting to monitor the ecological balance and/or displacement between introduced *Ae. albopictus* and indigenous *Ae. aegpyti* (domestic, peri-domestic and sylvatic populations).

Key words. *Aedes aegypti, Ae. albopictus,* arbovirus vector, dengue, invasive species, Bioko Island, Equatorial Guinea.

The highly invasive pest and vector mosquito *Aedes albopictus* continues spreading worldwide. Notorious as the 'Asian Tiger Mosquito', this day-active species transmits dengue viruses and was originally endemic to the Oriental Region (Hawley, 1988). The westward range of *Ae. albopictus* includes Indian Ocean islands up to the Chagos Archipelago (Lambrecht & van Someren, 1971), the Seychelles (Mattingly & Brown, 1955), Réunion (Hamon, 1956; Paupy *et al*., 2001), Mauritius (Kirk, 1928) and Madagascar (Fontenille & Rodhain, 1989) but apparently not Zanzibar or the Comoros (Brunhes, 1975). During the past two decades, *Ae. albopictus* has been inadvertently introduced to many parts of North and South America (Forattini, 1986; Hawley *et al*., 1987; Ibanez-Bernal & Martinez-Campos, 1994; Ogata & Lopez Samayoa, 1996; Moore & Mitchell, 1997; Broche & Borja, 1999; Rossi *et al*., 1999). Long ago this species reached Hawaii (Belkin, 1962; Rosen *et al*., 1976; Huang, 1977) where it was the vector responsible for a recent outbreak of dengue (HDH, 2002; Vazeille *et al*., 2003). So far, it has been prevented from invading Australia (Lamche & Whelan, 2003), but became established in Fiji by 1988 (Kay *et al*., 1995). After the first European report from Albania, where it was detected in 1979 (Adhami & Reiter, 1998; Vazeille-Falcoz *et al*., 1999), *Ae. albopictus* has become established in other countries around the Mediterranean such as Italy (Sabatini *et al*., 1990; Dalla Pozza & Majori, 1992; Mitchell, 1995a; Knudsen *et al*., 1996; Romi *et al*., 1999), France (Schaffner & Karch, 2000) and most recently Israel (Pener *et al*., 2003). The usual mode of introduction is assumed to be via dormant viable eggs, transported in tyres (Reiter, 1998), laid there by *Ae. albopictus* females that normally oviposit in tree-holes and other moist receptacles that might become flooded by rainfall whereby the eggs are stimulated to hatch when submerged.

In the Afrotropical Region, *Ae. albopictus* was reported by Doreau (1909) from a boat off Djibouti but is not established on the mainland of East Africa (Mattingly, 1953). Larvae of *Ae. albopictus* were unintentionally brought into South Africa repeatedly in used tyres imported

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from Japan, but subsequent entomological surveys showed that this species did not become established there (Cornel & Hunt, 1991). Thriving populations of *Ae. albopictus* were found in Nigeria in 1991 (Savage *et al*., 1992) and Cameroon in 2000 (Fontenille & Toto, 2001). We report here that *Ae. albopictus* has also become established in the island of Bioko, the offshore part of Equatorial Guinea, lying 30 km west of the Cameroon coast, in the Gulf of Guinea. This species was not found on Fernando Po, the former name of Bioko Island, by Gil Collado (1936) or other observers.

During November 2001, an entomological survey was implemented to evaluate the risk of malaria transmission in Planta (3°46′N, 8°46′E, altitude <100 m), 7 km from Malabo, the capital city of Equatorial Guinea. The area is a forested hilly landscape, locally cleared for construction of new settlements for oil workers. Adult mosquitoes were collected by traditional field entomology methods (Service, 1993): landing catches throughout day and night; overnight CDC light traps; morning knockdown spray-catch indoors. Among the samples obtained were 20 females of *Ae. albopictus*, comprising 14% of the total number of mosquitoes captured. Specimens were identified in the field and later confirmed at the OCEAC laboratory by reference to morphological descriptions (Darsie, 1986; Hawley, 1988). None of the *Ae. albopictus* was found indoors. Concomitantly, immature stages of mosquitoes (larvae and pupae) were collected from a wide range of suitable receptacles nearby, such as discarded tyres and plastic or metal containers of water (from tin cans to 200-L drums). *Aedes albopictus* larvae were found together with those of other mosquito species, including *Ae. aegypti*, *Ae. africanus*, *Culex quinquefasciatus*, *Cx. tigripes*, *Cx. duttoni*, *Cx.* near *decens*, *Mansonia africana* and *Eretmapodites quinquevittatus*. Voucher specimens have been deposited in the IRD collection at Montpellier, France, and at the OCEAC, Yaoundé, Cameroon. Anopheline mosquitoes of Bioko were surveyed recently by Berzosa *et al*. (2002) for the Malaria Control Programme of Equatorial Guinea. Together with recent reports on Simuliidae (McCall *et al*., 1998) and Tabanidae (Cheke *et al*., 2003), the medically important insects of Bioko Island are becoming known.

Aedes albopictus is a proven vector of dengue viruses and filarial worms in Asia (Hawley, 1988; Estrada-Franco & Craig, 1995a, b) and was recently found naturally infected with West Nile virus in the U.S.A. (Holick *et al*., 2002). It is a competent experimental vector of several other arboviruses, notably Chikungunya, Ross River and Japanese encephalitis viruses (Shroyer, 1986; Mitchell, 1995b), and can support development of Yellow Fever virus (Johnson *et al*., 2002). Presence in Bioko of this introduced vector, in association with the indigenous vector *Ae. aegypti*, raises public health concern because it increases the risk of arbovirus transmission in the island – as in nearby Cameroon and Nigeria, the only continental African countries so far known to be infested with *Ae. albopictus*. Considering their coexistence in other parts of the world where one or both of these species have been introduced, e.g. Brazil (Glasser & Gomes, 2000, 2002), Florida (O'Meara *et al*., 1995; Lounibos *et al*., 2002), Madagascar (Fontenille & Rodhain, 1989; Vazeille *et al*., 2001) and Singapore (Chan *et al*., 1971), it will be worthwhile to monitor the ecological balance between these two *Stegomyia* species in Bioko and African continental countries, perhaps involving competitive displacement (Gilotra *et al*., 1967; Rosen *et al*., 1976). It will be particularly interesting to watch for the development of niche partitioning with respect to the differential bionomics of domestic, peri-domestic and forest forms of *Ae. aegypti* in Africa (Mattingly, 1957; Tabachnick *et al*., 1979) versus the invading population of *Ae. albopictus*.

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