It seems unlikely that the species could have crossed the Haro and Rosario Straits, or travelled 150 km south along coast line, lacking suitable rock pools, even in the last hundred years, and more probable that the species is either endemic or has been transported from site to site. It may be significant that the known breeding sites of *Ae. togoi* in North America are within 10 km of commercial ports or ferry terminals and that these are in rocky harbors, many of which have suitable breeding sites.

Similar questions were raised in 1968 when *Ae. togoi* was discovered in one season breeding along 800 km of the tropical east coast of Malaysia (Ramalingam 1969). Neither the Malaysian nor the North American material can be distinguished morphologically from Japanese specimens making it unlikely that either has been isolated for very long.

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INSECT TRAPS FOR PIT LATRINES

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Pit latrines are a major breeding site for *Culex quinquefasciatus* (= *Cx. pipiens fatigans*) and blow flies (*Chrysomya putoria*). In Dar es Salaam, Tanzania, *Cx. quinquefasciatus* is particularly important as a vector of Bancroftian filariasis. Studies were conducted in the early 1970's of the use of chlorpyrifos (= Dursban (®)) which showed that the larvicidal action of this chemical persisted for many weeks (Bang et al. 1975). Since 1972 the Dar es Salaam City Council has carried out a programme of spraying chlorpyrifos 6 times annually in pit latrines, cesspits, etc. In 1979 a high degree of organophosphate resistance was detected in laboratory tests with *Cx. quinquefasciatus* collected in Dar es Salaam and other Tanzanian towns (Curtis and Pasteur 1981). Preliminary indications from a field study are that this resistance is causing a serious reduction in the effective persistence of a larvicidal treatment.

For these reasons and because of the high cost in foreign exchange of the chlorpyrifos programme, a completely different approach to the problem has been tried out—the use of "exit traps" placed over the apertures of the pits. The traps can be cheaply made. Raybould (1966) recorded the use of modified paint tins for this purpose and in recent trials in Dar es Salaam I used traps consisting of a mosquito proof box made of plywood and metal gauze carefully attached to a wooden frame (Fig. 1). The box is mounted on a plywood baseplate equipped with carrying handles. In the baseplate and bottom surface of the box there is a 15 cm diameter hole covered in metal gauze in which a 2 cm hole is made. The hole is surrounded by a 3 cm high tube of gauze. Mosquitoes and flies enter the trap through this tube, presumably attracted upward from the pit by light and/or fresh air. They do not readily find their way out again but, if some do so, they would only go back into the pit.

Insects caught in the traps die there in a day or two. No provision was made for removing the corpses but ants were seen removing dead mosquitoes. If in the long term they are found not to work fast enough to avoid the risk of clogging of the trap with dead flies it might be worthwhile to experiment with the introduction of a lizard into the trap to eat the captured insects. A slight elaboration of the trap, to incorporate an entry trap to catch gravid mosquitoes attempting to enter the pit, may be worthwhile. However, such an entry trap on a blow fly infested pit caught nothing, whilst the exit trap caught and killed hundreds of flies in a week.

Provision is made, with appropriately placed flaps of plywood attached below the baseplate, to block other easy exit routes for insects but a precision fit is not necessary since, as might be expected, all mosquitoes observed emerging from pits towards dusk took the obvious route into the well lit and aerated trap rather than

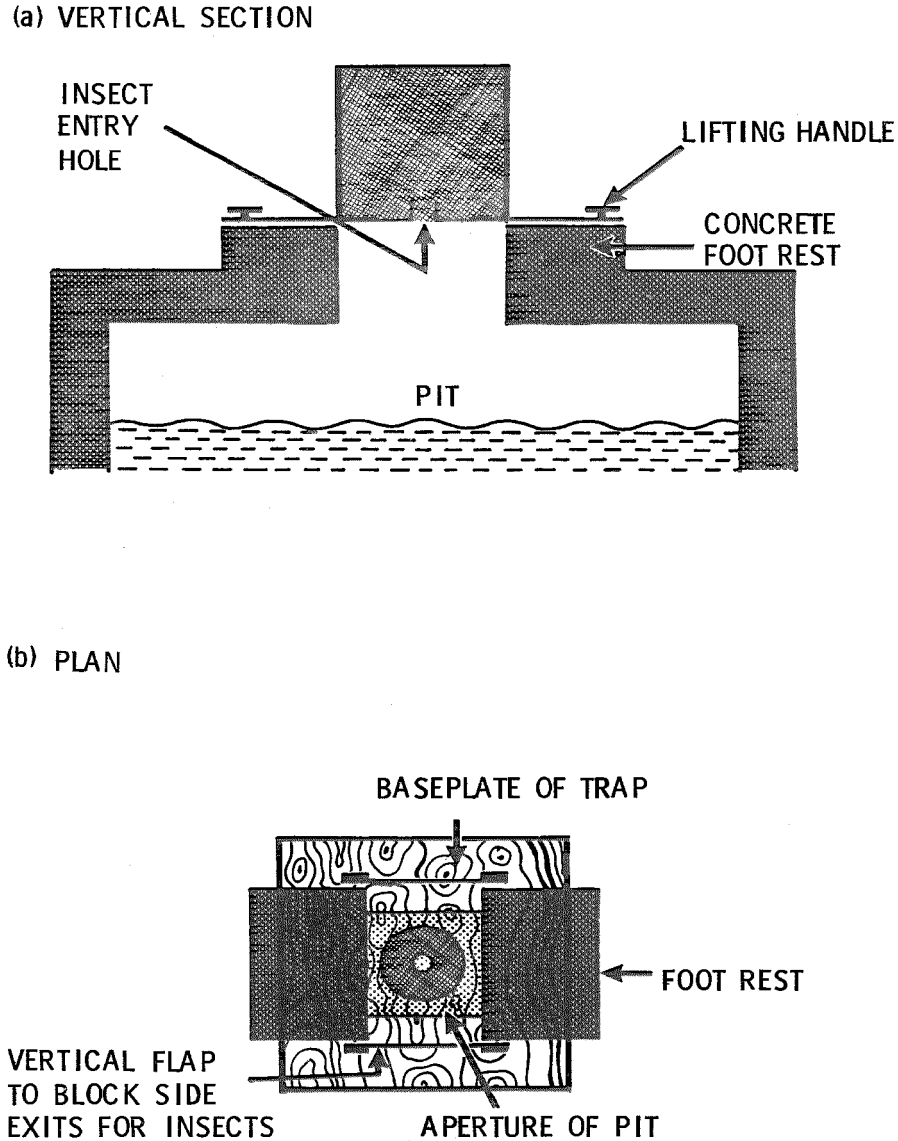

Fig. 1. Vertical section and plan of the exit trap in place over a latrine.

following the more tortuous alternatives. This is one of the advantages of a trap as compared with a lid—mosquitoes will eventually find small imperfections in the fitting of a lid.

The other advantage of a trap is in human reactions to them. The principle of the trap is readily understood and catches of mosquitoes or flies obtained from heavily infested pits are impressive and informative to the householder in showing where an insect pest problem originates and that it can be stopped at source by the "self-help" measure of always ensuring that the trap is put back in place after using the pit. Initial trials, in collaboration with the Dar es Salaam City Council, over periods of up to 2 weeks on a variety of pit latrines and cesspits in Dar es Salaam produced large catches of *Cx. quinquefasciatus* and blowflies and, in one case *Aedes aegypti,* and there were uniformly favourable reactions of householders to the traps which were always found in place when checks were made. It remains to be seen whether such co-operation can be achieved over the long term by an appropriate initial programme of public information followed by periodic checking on the traps for correct usage and for the repair of any damage. It also remains to be demonstrated that the area-wide use of traps is effective in suppressing the density of *Cx. quinquefasciatus* and blowflies in houses. If this can be confirmed it would seem that traps would be a more "appropriate technology" for dealing with insect problems arising from pit latrines than the use of imported insecticides of diminishing effectiveness because of the evolution of resistance.

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A METHOD FOR HOLDING SMALL POPULATIONS OF *GAMBUSIA AFFINIS HOLBROOKI* GIRARD

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The mosquito fish, *Gambusia affinis* has been used in mosquito control operations for many years as an effective biological agent in the suppression of mosquito larvae in permanent and semipermanent waters. In Florida, *G. a. holbrooki* Girard is generally present in both brackish and freshwater habitats. This situation affords a great reservoir of readily available fish for use in biological or integrated control efforts within mosquito control programs. The East Flagler Mosquito Control District found that it was time consuming and expensive to have inspectors catch these minnows every time to stock mosquito producing areas found while on larval inspection. The only effective method found to capture the fish, in the field, was a 51 cm diameter dip net with a 0.3 cm mesh. Consequently, the integration of fish within the mosquito control program was not reaching its fullest potential. To develop an economically feasible integrated control program, a stock of mosquito fish was established at the office compound.

Many who use mosquito fish utilize large concrete holding tanks (Johnson 1976), construct stocking ponds (Coykendall 1977), or use large free standing swimming pools (Johnson 1976) to hold their fish populations. However, these techniques appear to be more conducive to large scale *Gambusia* operations. A mosquito control district initiating a fish program may not want to go into such large scale production. Small, workable populations of *G. a. holbrooki* were held, for stocking purposes, in

[1] This work was performed while the author was Director of the East Flagler Mosquito Control District, Flagler Beach, Florida.