

INTERACTION BETWEEN MAN AND INSECTS IN THE URBAN ENVIRONMENT – THE CHAIRMAN’S INTRODUCTION TO A DISEASE VECTOR CONTROL WORKSHOP

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INTRODUCTION

Insects and closely related creatures cause human disease by their physical attack and by mechanical or developmental transmission of the causative organism, as well as discomfort and inconvenience. Urban environments worldwide are conducive to outbreaks of infestations such as bedbugs, scabies mites and human lice. Cockroaches and flies are ubiquitous pests of the urban environment, and several species of mosquito disease vector are particularly well adapted to these situations. Many of these problems exist simply because Man provides the pest species with its requirements for survival in the form of water, food and breeding sites, often by his own mismanagement of the environment.

WATER

In the urban environment a piped water supply is typically available, but storage before piping and disposal after use may often provide breeding sites for mosquitoes and other midges. In tropical areas the common vector of filariasis and Japanese encephalitis *Culex quinquefasciatus* prefers water contaminated with human detritus such as that in septic tanks, and the vectors of yellow fever and dengue fever *Aedes aegypti* and *Ae. albopictus* are typically found in small collections of water, in discarded containers on rubbish tips, drinking water containers and puddles. In Belize City for example, roadside gutters were heavily populated with larvae of *Ae. aegypti*, and *Ae. albopictus* has been found in ornamental containers in a hotel complex in the Maldives. This latter species has recently been introduced into the USA as far north as Chicago and into many parts of Italy through the agency of imported used vehicle tyres. The mosquito is readily able to establish itself in regions with a minimum mean temperature of 0°C and a mean annual rainfall of at least 500mm. *Culex molestus*, a savage man-biter in many temperate urban areas, has recently been found in flooded basements in government offices and a brewery in London, as well as in 67 out of 140 street drains investigated in Gibraltar. In a semi-urban area of the Sudan larvae of 9 mosquito species were identified in waste water collecting from a domestic air conditioning plant.

WASTE

Waste matter is accumulated in small domestic amounts, sometimes before being gathered into larger dumps. Decomposition of organic waste will provide the ideal media for development of fly larvae. The adults, having fed on potentially infected material, will take up and support enteric bacteria, viruses and other organisms, depositing them via their vomit drop, faeces or external body surfaces when they next feed, onto food intended for human consumption. In some developed countries health authorities may sometimes overreact to the presence of individual flies in catering and similar establishments, but there can be no doubt that their presence in large numbers is a potential threat to human health. Flies will also readily breed in human detritus which provides an ideal source of infection. Cockroaches typically breed in warm kitchens and feed on spilt waste and dustbin refuse, feeding equally happily on human food on which they vomit and defaecate.

Cockroaches are frequently found in drainage and sewage systems, from which they have ready access to human habitation. In their normal urban environment a wide range of potentially pathogenic organisms have been isolated from the cockroach gut. The sewers in Baghdad were known recently to be heavily infested with *Periplaneta americana*, and this species and also *Blatta orientalis* have been found regularly in sewers in London. In housing developments in Gaborone *P.americana* and *Blattella germanica* were common in pit latrines and in the kitchens directly above them.

DESIGN

The way in which urban dwellings are designed and fitted is often conducive to pest infestation. In kitchens, equipment is permanently fixed in position close but not sealed to wall surfaces, allowing harborage space for cockroaches and bedbugs, but not sufficient space to allow access for cleaning. Cosmetic panelling of pipework, and materials used for construction and insulation often provide similar harborages. The atap-type roof structure of semi-urban houses in Belize provided an ideal habitat for triatomine bugs, the potential vector of Chagas' disease, and the presence of cockroaches in many hospitals, hotels and other premises in towns and cities throughout the world is in large part due to the difficulty in obtaining access for cleaning and pesticide application to their harborages.

CONTROL

The requirements of insects for survival, namely food, water, shelter and warmth, are identical to those of Man. Many insect species have utilised these factors in the urban environment and taken every advantage of the way in which Man provides them. By removing or at least reducing these factors, Man can greatly assist in the control of many insect pests. Reduced access for insects to stored water and accumulated waste is possible, by containment, burial or even the use of polystyrene granules in domestic water containers to prevent mosquito breeding. Efficient drainage of waste water and infilling of potential breeding sites can be achieved at low cost. Better domestic hygiene will greatly reduce the potential breeding sites for flies and cockroaches. Effective education and publicity among the general population, and particularly perhaps among administrators, architects, designers, engineers and other professions, will increase an awareness of the factors leading to insect infestation and might result in positive changes to human domestic habits, the construction of buildings and the design of their interiors. This in turn would make it more difficult for insects to establish themselves, and would certainly make the control of infestations easier and cheaper to achieve. With the dramatic increase in travel and the exchange of goods, the differentiation between tropical and temperate pests and diseases is becoming less clear cut, and although the possible effects of global warming on disease transmission may have been exaggerated, there is considerable potential for the introduction of so-called tropical conditions such as dengue fever into temperate areas. Crowded urban situations are conducive to the proliferation of human lice and re-establishment of typhus. The increasing presence of domestic pets and feral animals encourages the rapid multiplication of fleas, with the risk of the re-establishment of plague, and any deterioration of standards of hygiene will result in an increased incidence of mechanically transmitted excremental diseases.

Economic and social conditions encourage the proliferation of insect-borne diseases in both tropical and temperate urban environments. The need to control these pests is paramount.