Isolation Of Fungi And Bacteria From Housefly (Musca Domestica L.) Larvae

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Citation

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Abstract

Housefly larvae were cultured on meat and collected for the isolation and identification of microorganisms associated with them. The microbes were cultured from both the gut and body surface of the maggot on nutrient agar (for bacteria) and potato dextrose agar (for fungi) and incubated at about 37°C for 48 hrs before observations. A variety of microorganisms, which includes the pathogenic Staphylococus aureus, pseudomonas sp. and Aspergillus niger and Aspergillus flavus were isolated.

INTRODUCTON

The housefly, Musca domestica Linnaeus, is a well-known cosmopolitan pest of both farm and home. This species is always found in association with humans and human activities, it is also found on hog and poultry farms, horse stables and ranches. Not only are houseflies a nuisance, but they can also transport disease-causing organisms. Excessive fly populations are not only an irritant to farm workers but, when there are nearby human habitations, a public health problem could occur [1]. The housefly is one of the most common and persistent insects found within human homes. In fact, the housefly has a strong, interdependent relationship with man and will travel with human populations to even the coldest region.

They are scavengers, consuming large quantities of decaying animal matter. However, some are injurious to humans by virtue of the fact that they feed on and breed in trash, decaying flesh, and bodily waste. This behaviour facilitates the spread of diseases such as tuberculosis, typhoid fever, cholera, diarrhoea, Staphylococcal food poisoning and Shigellosis [2], [3]. Housefly larvae, or maggots, will eat most decaying animal or vegetable matter [4]. The housefly (Musca domestica L.) is known to be a vector of diseases. These flies are prevalent in exposed items. Contamination of drinking water, food and other dairy products with faecal remains are common features in these areas. Hence the likelihood of human excrement being transmitted by flies is great [5]. Housefly are the most important insect pest associated with poultry, where the accumulated organic waste and favourable environmental conditions often promote rapid development of large populations [6]. The aim of this study is to isolate the microorganisms associated with housefly larva.

MATERIALS AND METHODS

Fresh meat was exposed in shade for the infestation of houseflies. The developed maggots were collected with sterile forceps. Aseptic procedures were carried out so as to minimize contamination from bacteria not associated with the collected maggots.

CULTURE MEDIA

The following media were used in culturing the microorganisms; nutrient agar and potato dextrose agar.

ISOLATION OF INTERNAL AND EXTERNAL MICROBES

Two maggots were allowed to move freely on the solidified agar media for 5 min so that they can deposit the microbes on them on the agar media. Two maggots were placed in a beaker containing 10 ml sterile water and thoroughly mixed together by shaking the beaker in order to ensure even distribution of the particles on the maggots. 0.5 ml of the suspension was pipette into molten agar media. The preparation was gently mixed together. For the external microbes, maggots were first surface sterilized by placing them in 70% ethanol and then rinsing in sterile water. A sterile blade was then used to dissect the maggots thereby revealing the gut. A maculating loop was flamed and allowed to cool and then it was used to obtain exudates of the gut. The obtained exudates were streaked on the

solidified agar media [7].

CULTURE PROCEDURES

The nutrient agar and potato dextrose agar were used to culture both external and internal microbes. Then 0.5 ml of the body surface suspension was pipetted and transferred into prepared nutrient agar and potato dextrose agar in a Petri dish. To culture the microbes from the gut, 0.5 ml solution of already dissected 2 maggots in 10 ml in distilled water was pipetted and poured into the already prepared potato dextrose agar and nutrient agar. The test tubes are then plugged with non-absorbent cotton swab, and then properly sealed with aluminium foil. The Petri dishes placed in an incubator under a temperature of 37°C for 48 h.

After incubation period, the Petri dishes were checked for microbial growth. In order to identify the microorganisms cultured on the agar, they were sub-cultured on already prepared nutrient agar and potato dextrose agar. The Petri-dishes containing the media were placed in an incubator under a temperature of about 37°C for 48 h (for bacteria) and 4-5 days (for fungi). After the incubation period, the isolates were observed and identified.

CHARACTERIZATION AND IDENTIFICATION OF MICROBIAL ISOLATES

Bacterial isolates were characterised and identified using the following, gram staining, catalase, coagulase, motility and starch hydrolysis tests. The fungi isolates were characterized based on the colour of aerial and substrate hyphen. In addition, the nature and shape as well as the presence of special structures e.g. rhizoid were noted other structures were examined.

RESULTS

It was observed that the bacterial isolates recovered were Staphylococus aureus and Pseudomonas sp (Table 1). While the fungal isolates observed were Aspergillus niger and Aspergillus flavus (Table 2).

Figure 1

Table 1: Characteristics of the bacterial morphology and biochemical isolates of maggots

Gram stain	shape	Catalase	Coagulase	Motility	Oxidase	Glucose	Lactose	Maltose	Organisms
+	C	+	+	–	–	+	–	+	*Staphylococcus aureus*
–	R	–	–	+	–	+	–	–	*Pseudomonas spp.*

R: Rod

C : Cocci

+ = Positive and - = Negative

Figure 2

Table 2: Characteristics of fungal Isolates of maggots

Isolated fungi	Colour of aerial hyphae	Nature of hyphae	Shape of sexual pore	Growth form
Aspergillus Niger	Black	Septate	Oval black	Velvety to flaky Surface
Aspergillus Flavus	Yellow green	Septate	Oval	Velvety to flaky Surface

DISCUSSION

The houseflies are much more than a nuisance and that they pose serious health risks as mechanical vectors.

It was observed that the bacteria isolates recovered were gram positive bacteria (Staphlococus aureus) and gram negative (Pseudomonas), and they shows acidic response towards glucose, lactose and maltose and most of these microbes are pathogenic which is in accord with the work of Banjo et al. [7], where he isolated a variety of microorganisms, which includes the pathogenic Staphylococcus aureus, Pseudomonas aerruginosa and Bacullus subtilis, and the work of Axtell [6], that isolated Pseudomonas spp. and Escherichia coli. The fungi recovered were Aspergillus niger and Aspergillus flavus, they are all pathogenic fungi that is liable to produce mycotoxin. The use of maggots as feed supplement for livestock and fishes is a common practise by the local farmers. The recovery of pathogenic microorganism as microflora of microbes such as Staphlococus aureus, Pseudomonas, and Aspergillus sp. can cause various infectious disease in livestocks. Staphlococus aureus is capable of causing toxigenic food poisoing and some other infectious disease which would result in diarrhoea [9]. Those diseases could be associated with livestock that have ingested the organism.

CONCLUSION

Houseflies move from animal or human faeces to food that

will be eaten uncooked by humans. Also, when consumed by flies, some pathogens can be harboured in the mouthparts or alimentary canal for several days, and then be transmitted when flies defecate or regurgitate. In situations where plumbing is lacking, such as open latrines, serious health problems can develop, especially if there are outdoor food markets, hospitals, or slaughter houses nearby. Among the pathogens commonly transmitted by houseflies are Salmonella, Shigella, Campylobacter, Escherichia, Enterococcus, Chlamydia, and many other species that cause illness. These flies are most commonly linked to outbreaks of diarrhoea and shigellosis, but also are implicated in transmission of food poisoning, typhoid fever, dysentery, tuberculosis, anthrax, ophthalmic, and parasitic worms.

References

1. www.wikipedia.com Retrieved in February 2008.
2. Sack, R. B., Gorbach, S. L. and Banwell, J. G. (1971). Enterotoxigenic E. Coli isolated from patients with severe cholera like disease. J. Infect. Dis. 128: 378 - 385
3. Connor, E. B. (1966). Shigellosis in the adult. JAMA 198: 717 – 720.
4. Service, M.W.(2000). Medical Entomology for Students. 2nd edition Cambridge university press. P 65.
5. Gangarosa, E. J. and Beisel, W.R. (1960).The nature of the Gastrointestinal lesion in Asiatie cholera and its relation to pathogenesis. A Biopsy Study. 125-135.
6. Axtell,R.C. (1970). Integrate fly control program for caged poultry houses. Nigeria Journal Entomology, 63:400-405.
7. Banjo,A.D., Lawal, O.A. and Osinuga,B.O.(2004). Reservoir Competence of Alphitobius diasperinus in Nigeria. Asian Journal Microbial Biotechnology Environmetal Science, 6(3):7-11.
8. Akonai, A. K., Oguniyi, A. D., Lamikanra, A. and Torimire, S. E. A. (1991). The characterisation of clinical isolates of Staphylococcus anareus in Ile-ife, Nig. J. Med. Microbiol. 34: 109-112

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