

# Bacterial and fungal flora of seagull droppings in Jersey

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**SYNOPSIS** In Jersey 166 fresh and 122 dried seagull droppings were obtained and studied locally and in London for the presence of bacteria and fungi of potentially pathogenic nature. There were no salmonella or shigella bacteria isolated from the two groups but there was a high proportion of *Candida albicans* obtained from the fresh material (21.7%) and only 1.6% from the dry faeces. *Cryptococcus neoformans* and *Histoplasma capsulatum* were not found in either the dry or fresh droppings. The normal bacterial and fungal flora of the seagull was established and it is considered that the *C. albicans* in fresh gull droppings would not materially increase *albicans* infections in man.

The association between pigeon droppings and the isolation of *Cr. neoformans* was first described by Emmons (1955). This yeast has been isolated from pigeon droppings in London by Randhawa, Clayton, and Riddell (1965) and by Partridge and Winner (1965). The relationship of *H. capsulatum* to avian habits has been reviewed by Ajello (1964) and the organism has been reported in droppings from chickens, pigeons, and bats (Lehan and Furcolow, 1957; Stoker, 1964). Seagulls are common birds in coastal and island areas, and although yeast species and trematodes in the gull have been studied (Kawakita and van Uden, 1965; Harris, 1964), not much attention has been paid to these birds as possible sources of infection to man; the normal bacterial and fungal flora of the seagull also seems to be obscure. The commonest resident species of gull in Jersey is the herring gull (*Larus argentatus*) but large numbers of the black-headed gull (*Larus ridibundus*) also winter in the island. The great black-backed gull (*Larus marinus*) and the lesser black-backed gull (*Larus fuscus*) both nest sparingly on the north coast and are sometimes seen elsewhere in the island. Specimens of droppings were collected from around the hospital and also on the southern and eastern shores of the island; the north coast was not studied. Although the possibility of their droppings having been collected is small, the contribution made by the great black-backed gull and the lesser black-backed gull cannot be excluded altogether.

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## Method

Throughout all seasons of 1967 and 1968 fresh droppings from seagulls were collected on sterile cotton wool swabs moistened with saline; the dried droppings were obtained in similar manner from areas frequented by seagulls. The colour of the dropping was noted and the swab then plated onto 5% horse blood agar containing 0.05 g/l chloramphenicol, McConkey agar, and 1% glucose agar in addition to Sabouraud's glucose medium with 0.05 g/l chloramphenicol. The plates were incubated at 37°C with the exception of the Sabouraud's medium which was grown at room temperature. No anaerobic cultures of the droppings were made. A smear was prepared from each dropping and stained by the Gram method. Production of chlamydo-spores on corn-meal agar and germ-tube formation in one and a half hours when inoculated into human serum were used as confirmatory tests for *Candida albicans*. The blood agar and glucose agar plates were kept for two weeks and the fungi growing on the Sabouraud's cultures were retained indefinitely by means of subculture until the fungus had been identified.

## Results

### BACTERIOLOGY

#### *Fresh droppings*

The commonest colours of these droppings were brown, white, yellow, grey, and green. Polymorphs

were present in moderate numbers in three droppings and in small numbers in 10 specimens; in no case was there frank mucopus or red blood cells. The commonest bacteria in the faecal flora were *Escherichia coli*, followed by *Aerobacter aerogenes*, *Proteus* sp, paracolon organisms including *Hafnia alvei* and also *Alkaligenes faecalis*. Other bacteria found with regularity were members of the genus *Lactobacillus*, *Bacillus subtilis* and *Bacillus cereus*, *Staphylococcus aureus* and *albus*, and also *Streptococcus faecalis*.

#### Dry droppings

The number and types of bacteria were greatly reduced as compared with those of fresh droppings. The colours were white, brown, yellow, and green. Polymorphs were present in scanty numbers only in eight droppings and there was no mucopus. The commonest bacteria were *E. coli*; the other Gram-negative bacilli mentioned in the fresh droppings were present but in reduced numbers. There were no salmonella or shigella pathogens.

#### MYCOLOGY

##### Fresh droppings

Candida-like cells could be seen in the majority of the Gram smears; *C. albicans* was isolated from 36 of the 166 droppings examined (21.7%). Other yeasts in order of frequency of isolation (the number of isolations appearing in brackets) were *C. guilliermondii* (7), *Rhodotorula* sp. (4), *C. krusei* (2), *Trichosporon* sp (2), and *Torulopsis glabrata* (1). The filamentous fungi isolated included species of *Geotrichum*, *Pullularia*, *Neurospora*, *Penicillium*, *Aspergillus*, *Rhizopus*, *Scopulariopsis*, and *Fusarium*. Neither *Cr. neoformans* nor *H. capsulatum* strains were isolated.

##### Dry droppings

Only in two of the droppings was *C. albicans* isolated out of a total of 122 studied (1.6%). A similar flora to that of the fresh droppings was seen and neither *Cr. neoformans* nor *H. capsulatum* were found. The yeasts isolated were *C. parapsilosis* (3), *C. krusei* (1), *C. melibiosi* (1), *C. zeylanoides* (1), *Cr. lactivorius* (1), and *Torulopsis famata* (1). *Sporotrichum* species were the most common filamentous fungi grown. *Epicoccum*, *Phoma*, *Aspergillus*, *Fusarium*, and *Streptomyces* species were also found.

#### Discussion

The absence of salmonella and shigella from the fresh and dry droppings, in spite of the scavenging

habits of herring gulls, suggests that the foreshore is clean and that sewage disposal is adequate. The normal bacterial flora of seagulls consists of *E. coli* and other members of the *Enterobacteriaceae*, *Bacillus subtilis* and *B. cereus*, *Staphylococcus aureus* and *S. albus*, *Streptococcus faecalis*, and members of the genus *Lactobacillus*.

Large numbers of seagull droppings were screened for the presence of *Cr. neoformans* and *H. capsulatum*; both these pathogens were absent. Partridge and Winner (1965) found that *Cr. neoformans* could be isolated from pigeon droppings in the warmer months but not in winter. It should be pointed out that the present study of seagull droppings extended throughout the year and was not confined to summer. There is a high natural salt content of all masonry around the shore and this might be a potential inhibiting agent. It is well known that this yeast is more readily recovered from specimens of organic material collected from sheltered sites, inside and outside of buildings, not in direct contact with organically enriched soil (Denton and di Salvo, 1968).

The absence of *H. capsulatum* was not surprising. Moisture and temperature are critical for the survival of this fungus (Goodman and Larsh, 1967). The geographical distribution of isolations of this fungus from soil includes the USA, Mexico, Panama, South America, Africa, and Malaya (Ajello, 1964). It has not yet been isolated from British soil.

The isolation of *C. albicans* from 21.7% of fresh droppings suggests that gull faecal material is a good growth medium for some fungi and also bacteria. *C. albicans* is found as a saprophyte in the human bowel and this incidence increases with the use of broad-spectrum antibiotics (Seelig, 1966); the *C. albicans* found in seagulls is also most probably a saprophyte.

Whilst the incidence of candidiasis has increased in recent years (Seelig, 1966) it is most unlikely that the presence of this yeast in seagull droppings can materially add to human carriage rate in coastal areas. To be transmissible the yeast would have to be present in dried droppings as is the case with *Cr. neoformans* in the excreta of pigeons. In fact, *C. albicans* is present only in a small number of dried droppings and any transmission from fresh faeces would have to be by direct contact and this is unlikely. It is also improbable that contamination of fresh water reservoirs in coastal areas by fresh seagull droppings would be a major problem, particularly in view of the low water temperatures of the northern latitudes (Taysi and van Uden, 1964); this might be a problem, however, in warmer countries.

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References

- Ajello, L. (1964). Relationship of *Histoplasma capsulatum* to avian habitats. *Publ. Hlth Rep. (Wash.)*, **79**, 266-270.
- Denton, J. F., and Salvo, A. F. di (1968). The prevalence of *Cryptococcus neoformans* in various natural habitats. *Sabouraudia*, **6**, 213-217.
- Emmons, C. W. (1955). Saprophytic sources of *Cryptococcus neoformans* associated with the pigeon (*Columba livia*). *Amer. J. Hyg.*, **62**, 227-232.
- Goodman, N. L., and Larsh, H. W. (1967). Environmental factors and growth of *Histoplasma capsulatum* in soil. *Mycopathologia (Den Haag)*, **33**, 145-156.
- Harris, M. P. (1964). The incidence of some species of trematoda in three species of Larus gulls in Wales. *Mycopathologia (Den Haag)*, **106**, 532-536.
- Kawakita, S., and Uden, N. van. (1965). Occurrence and population densities of yeast species in the digestive tracts of gulls and terns. *J. gen. Microbiol.*, **39**, 125-129.
- Lehan, P. H., and Furcolow, M. L. (1967). Epidemic histoplasmosis. *J. chron. Dis.*, **5**, 489-503.
- Partridge, B. M., and Winner, H. I. (1965). *Cryptococcus neoformans* in bird droppings in London. *Lancet*, **1**, 1060-1061.
- Randhawa, H. S., Clayton, Y. M., and Riddell, R. W. (1965). Isolation of *Cryptococcus neoformans* from pigeon habitats in London. *Nature (Lond.)*, **208**, 801.
- Seelig, M. S. (1966). The role of antibiotics in the pathogenesis of Candida infections. *Amer. J. Med.*, **40**, 887-917.
- Stoker, D. J. (1964). Histoplasmosis in Cyprus: Report of two cases. *Brit. med. J.*, **11**, 793-795.
- Taysi, I., and Van Uden, N. (1964). Occurrence and population densities of yeast species in an estuarine-marine area. *Limnol. Oceanon.*, **9**, 42-45.