

Dept. of Food Hygiene and Microbiology,
 Fac. of Vet. Med., Cairo University.
 Head of Dept. Prof. Dr. A. Moursy.

**DEMATIACEOUS HYPHOMYCETES IN SLAUGHTERED
 CAMELS, CATTLE AND SURROUNDINGS AT CAIRO ABATTOIR**
 (With 5 Tables and One Figure)

By

N. MANSOUR; M. HAMDY; N. YASSIEN and M. REFAI
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الفطريات ذات اللون الداكن في ذبائح الجبال والأبقار ومايحيط بها في مجزر القاهرة

ندا منصور ، منير حمدي ، نبيل يس ، محمد رفاي

تم جمع ٢٥٠ عينة من أسطح ذبائح الجبال والأبقار ومن محتويات أمعائها وكذلك من هواة وحواش وأرضيات عنابر الذبح . وقد عزلت ٨٠٠ عترة من الفطريات ذات اللون الداكن وكان ذلك بنسبة ٥٢.٥٩% من الجبال ، ٤٧.٤٠% من الأبقار . وقد تم تصنيف العترات المعزولة إلى سبعة عشر نوع تخص الأجناس التالية : الكلاوسوروم (٤٨.٣٨%) ، الألترناريا (١٧.٥٩%) ، الهولوكلاسيوم (٤.٨٨%) ، العيالوفورا (٠.٨٦%) ، الومفا (٥.٢%) ، الراكيبوروم (١٧.٤٠%) ، الدرسيكلرا (١٧.٤٠%) ، الفراجوساسباسهولا (١٧.٤٠%) والإسيريجلوس (٢٧.٢٤%) . وقد ناقش الباحثون أهمية تلك الفطريات على الذبائح من الناحية الصحية وخطورتها على الصحة العامة ومصادر التلوث بها .

SUMMARY

Dematiaceous hypomycetes which may be encountered in slaughtered camels, cattle and in the surrounding environment at Cairo abattoir were isolated and identified. For this purpose 250 samples were collected from surfaces of slaughtered camels and cattle and their intestinal contents as well as from air, walls and floors of slaughter halls. 580 Dematiaceous hyphomycetes were isolated, 52.59% and 47.41% from camels and cattle respectively.

The main isolated genera were cladosporium (38.48%), Alternaria (17.59%), Ulocladium (4.48%), Phialophora (0.86%), Phoma (0.52%), Brachysporium (0.17%), Drechslora (0.17%), Phragospathula (0.17%) and Aspergillus (37.24%). From these genera Aspergillus niger and other 16 species could be also identified.

The hygienic significance and zoonotic importance of the isolated Dematiaceous hyphomycetes, sources of contamination and the recommended hygienic measures were discussed.

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INTRODUCTION

Black fungi are classified in the Class Hyphomycetes, mainly in the family Dematiaceae e.g. *Alternaria*, *Cladosporium*, *Drechslera*, *Phialophora*, *Ulocladium* and others which has mostly dark conidia and conidiophores (ARX, 1968; ELLIS, 1971 & 1976; DOMSCH *et al.*, 1980; GEDEK, 1980; SAMSON *et al.*, 1981). Moreover, some fungi of the family moniliaceae are known to produce black colonies such as *Aspergillus niger*.

Most of these black hyphomycetes as *Alternaria*, *Cladosporium*, *Stemphylium* and *Aspergillus niger* colonize on surfaces as well as electric apparatus, cool cabinets, refrigerators, in the presence of suitable environments as high relative humidity (nearly 84%) and traces of foods and/dirts. Formation of unagreeable dark spots and unpleasant odour is not uncommon (FILIP, 1979; MORGENSTERN, 1982; SEAL & PATHIRANA, 1982; FRANK, 1983).

In food hygiene some of dematiaceous hyphomycetes plays a great role. Black spots may be formed on the superficial layers of carcasses of food animals, stored at low temperatures for a long time, by the growth of *Cladosporium herbarum*, *cladosporium cladosporioides*, *Penicillium hirsutum* and *Aureobasidium pullulans* (GILL *et al.*, 1981; LOWRY & ASHTON, 1982), as well as on the surfaces of meat products especially raw and pickled ones. Such fungi have proteolytic action and mouldy odour (LEISTNER & AYRES, 1967; HADLOK, 1970; HADLOK *et al.*, 1976; LOTFI *et al.*, 1983).

In addition to several members of the genera *Cladosporium* (*C. herbarum*, *C. cladosporioides*, *C. sphaerospermum*, *C. resinae*, *C. macrocarpum* & *C. tenuissimum*) species of *Alternaria*, *Aureobasidium*, *Ulocladium*, *Phoma* and *Aspergillus niger* group are known to colonize on food of animal and plant origin (SAMSON *et al.*, 1981; MANSOUR, 1986 and OZARI, 1987).

On the other hand, some dematiaceous fungi are known to cause diseases in man e.g. species of *Phialophora* which may cause Chromomycosis, and *Cladosporium werneckii* the cause of *Tinea nigra* (FREY *et al.*, 1979).

The aim of this work was to survey the different types of Dematiaceous moulds contaminating slaughtered animals mainly camels and cattle (Carcase surface and intestinal contents), and surroundings (air, walls and floors of the slaughter hall).

MATERIALS and METHODS

1. Collection of samples

A total of 250 samples was taken from surfaces of slaughtered animals, namely camels and cattle, intestinal contents of both, slaughter halls including air, walls and floors. The samples were classified as following:

* 100 swabs from camel and beef carcasses (50 each); 25 from outer side of thigh and 25 from shoulder.

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- * 50 samples from intestinal contents of both slaughtered animals (25 each).
- * 60 samples from air of both slaughter halls (30 each).
- * 40 swabs from walls and floors of both slaughter halls (20 each).

2. Methods :

* Swabs were taken from carcase surfaces, walls as well as floors of both slaughter halls as described by BOER (1979).

* Air examination was carried out by sedimentation method (WALLHÄUSSER, 1984) and the other precautions stated by MANSOUR (1986).

* Intestinal contents were examined according to methods recommended by KLARE (1971) and ABD-EL-RAHMAN (1981).

* Isolation of different types of Dematiaceous hyphomycetes was done by methods recommended by FREY et al. (1979), MANSOUR (1986), and the differentiation of their types was achieved according to (VRIES, 1952; ELLIS, 1971 & 1976, FREY et al., 1979 and DOMSCH et al., 1980).

RESULTS

In this study 17 species belonging to 9 genera of Dematiaceous fungi were isolated from surfaces of meat and the environment in the abattoir (Fig. A).

As shown in table (1) *Cladosporium* species were the most frequently recovered fungi, followed by *Aspergillus niger* *Alternaria* and *Ulocladium*. *Phialophora*, *phoma*, *Brachysporium*, *Drechslera* and *Phragmopathula* were rarely isolated.

From table (2) it is clear that *Cladosporium* species and *Aspergillus niger* were found both on surfaces of slaughtered camels and in the intestinal contents as well as in the air, at the walls and floors of slaughter halls, *Alternaria* species on the surface and in intestinal contents and only in the air of the halls. The other fungi were sporadically isolated. Almost the same distribution was observed in case of cattle (Table 3).

In this study 7 species of *Cladosporium* were isolated, namely *C. herbarum*, *C. cladosporioides*, *C. macrocarpum*, *C. species*, *herbarum* constituted a little more than half the recovered *cladosporium* species, i.e. it was the most frequent of species and it could be recovered from all types of samples. *Cladosporium cladosporioides* was particularly frequent in the intestinal contents of both camels and cattle. The other species were sporadically recovered from slaughter halls (Table 4).

Table (5) demonstrates the *Alternaria* species identified in this study. It was interesting to note that *A. alternata* and *A. radicina* were mainly inhabiting the intestine in both species of animals. *A. sonchi* was recovered only once from the walls of cattle slaughter hall.

Fig. (A): Dematiaceous fungi isolated from meat and surroundings**Alternaria Nees ex Fries, 1821.***A. alternata.**A. radicina**A. sonchi.***Aspergillus Micheli ex Fries, 1821.***A. niger* van tieghem.**Brachysporium Saccardo, 1880***B. britannicum***Cladosporium Link ex Fries, 1821***C. herbarum**C. Cladosporioides**C. sphaerospermum**C. resinae**C. teruissimum**C. macrocarpum**C. species***Drechslera Ito, 1930***D. poae***Phialophora Medlar, 1915***P. pedrosoi***Phoma Saccardo 1880***P. Leveillei***Phragospathula Subramanian & Nair 1966***P. phoenicis***Ulocladium Preuss, 1851***U. artum*

Table (1): Dematiaceous hyphomycetes isolated from slaughtered camels & cattle

Type of Dematiaceous fungi	No. of isolates		Total	
	camel	cattle	No.	%
Cladosporium	108	117	225	38.75
Aspergillus niger	113	103	216	37.24
Alternaria	57	45	102	17.59
Ulocladium	21	5	26	4.48
Phialophora	2	3	5	0.86
Phoma	2	1	3	0.52
Brachysporium	-	1	1	0.17
Drechslera	1	-	1	0.17
Phragospathula	1	-	1	0.17
Total	105	275	580	
%	52.59	47.41		100

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Table (2): Dematiaceous hyphomycetes isolated from slaughtered camels & Surroundings

Isolates	Carass						Slaughter hall				Total	
	Surface		Intes. cont.		Air		Walls		Floors		No.	%
	No.	%	No.	%	No.	%	No.	%	No.	%		
Cladosporium	16	55.17	66	33.00	4	11.77	7	50.00	15	53.57	108	35.41
Aspergillus niger	10	34.48	59	29.50	27	79.41	5	35.71	12	42.86	113	37.05
Alternaria	2	6.90	52	26.00	3	8.82	-	-	-	-	57	18.67
Ulocladium	-	-	21	10.50	-	-	-	-	-	-	21	6.88
Phialophora	-	-	-	-	-	-	2	14.29	-	-	2	0.66
Phoma	1	3.45	-	-	-	-	-	-	1	3.57	2	0.66
Brachysporium	-	-	-	-	-	-	-	-	-	-	-	-
Drechslera	-	-	1	0.50	-	-	-	-	-	-	1	0.33
Phragospathula	-	-	1	0.50	-	-	-	-	-	-	1	0.33
Total	29		200		34		14		28		305	
%	9.51		65.57		11.15		4.59		9.18		100	

Table (3): Dematiaceous hyphomycetes isolated from slaughtered cattle & surroundings

Isolates	Carcase				Slaughter hall						Total	
	Surface		Intes. cont.		Air		Walls		Floors		No.	%
	No.	%	No.	%	No.	%	No.	%	No.	%		
Cladosporium	19	65.52	71	36.41	5	55.56	8	40.00	14	63.64	117	42.55
Aspergillus niger	7	24.14	79	40.51	3	33.33	9	45.00	5	22.73	103	37.46
Alternaria	3	10.34	39	20.00	1	11.11	2	10.00	-	-	45	16.36
Ulocladium	-	-	5	2.56	-	-	-	-	-	-	5	1.82
Phialophora	-	-	-	-	-	-	1	5.00	2	9.09	3	1.09
Phoma	-	-	-	-	-	-	-	-	1	4.54	1	0.36
Brachysporium	-	-	1	0.51	-	-	-	-	-	-	1	0.36
Drechslera	-	-	-	-	-	-	-	-	-	-	1	0.36
Phragospathula	-	-	-	-	-	-	-	-	-	-	-	-
Total	29		195		9		20		22		275	
%	10.55		70.91		3.27		7.27		8.00		100	

Table (4): Cladosporium types isolated from camels, cattle & surroundings

Type of Cladosporium	Camel				Cattle											
	Corcase Surface Thigh Sch. Cont.	Intes. Cont.	Air	Slaughter hall Walls Floors No.	Corcase Surface Thigh Sch. Cont.	Intes. Cont.	Air	Slaughter hall Walls Floors No.								
C. horbarum	11	2	27	4	6	12	62	57.40	2	2	40	4	5	9	62	52.99
C. cladosporioides	-	1	36	-	-	1	38	35.18	-	-	14	-	1	3	18	15.39
C. macrocapum	-	-	-	-	-	1	1	0.93	-	14	6	1	-	-	21	17.95
C. species	-	-	1	-	-	-	1	0.93	1	-	5	-	2	1	9	7.69
C. sphaerospermum	2	-	1	-	1	-	4	3.70	-	-	2	-	-	1	3	2.56
C. resiniae	-	-	1	-	-	-	1	0.93	-	-	4	-	-	-	4	3.42
C. tenuissimum	-	-	-	-	-	1	1	0.93	-	-	-	-	-	-	-	-
Total	13	3	66	4	7	15	108	100	3	16	71	5	8	14	117	100
X	12.04	2.78	61.11	3.70	6.48	13.09	100	2.56	13.68	60.68	4.27	6.81	11.97	100	100	100

Table (5): Alternaria types isolated from camels, cattle & surroundings

Type of Alternaria	Camel				Cattle										
	Corcase Surface Thigh Sch. Cont.	Intes. Cont.	Air	Slaughter hall Walls Floors No.	Corcase Surface Thigh Sch. Cont.	Intes. Cont.	Air	Slaughter hall Walls Floors No.							
A. alternata	1	1	39	3	-	44	77.19	-	3	37	1	-	-	41	91.11
A. radicina	-	-	13	-	-	13	22.81	-	-	2	-	1	-	3	6.67
A. sonchi	-	-	-	-	-	-	-	-	-	-	-	1	-	1	2.22
Total	1	1	52	3	-	57	100	-	3	39	1	2	-	45	100
X	1.75	1.75	91.24	5.26	-	100	-	6.67	86.67	2.22	4.44	-	-	100	100

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DISCUSSION

The results achieved in the present work are somewhat in agreement with results reported in the literature (KRAMER *et al.*, 1959; KLARE, 1970; BAXTER & ILLISTON, 1976, ABD EL-RAHMAN, 1981 and MANSOUR, 1986).

Of particular interest was the recovery of 7 species of cladosporium. Most of them could produce black spots on cold stored meats, as well as raw meat products (raw ham). Most of the authors, however incriminated *Cladosporium herbarum* and *Cladosporium cladosporioides* (MASSEE, 1912; LEISTNER & AYRES, 1967; GILL *et al.*, 1981 and MANSOUR, 1986). Other species of cladosporium are reported to cause problems in foods (SAMSON *et al.*, 1981).

The other isolated Dematiaceous hyphomycetes as *Alternaria*, *Aspergillus niger*, *Phoma*, *Drechslera* were also reported to colonize on surfaces (FRANK, 1983). *Phialophora* species (*P. pedrosi*) could produce chromomycosis (FREY *et al.*, 1979). *Ulocladium* was isolated from meat products by HADLOK (1970). In this work all 26 *Ulocladium* (4.48%) were isolated from intestinal contents of both camels and cattle. From the results of the present work it is clear that the intestinal contents constitute an important reservoir of black fungi which may contaminate the meats directly or indirectly by contaminating the slaughter halls. The hygienic measures during slaughtering, processing and transportation of meat and meat products are there fore of utmost importance in practice.

On the other hand, building of walls should be from special types of building material, spraying of rooms and slaughter halls with suitable antifungal agents, blocking of the cracks in walls are some of the recommended protective measures (PANTKE, 1976; SEAL & PATHIRANA, 1982 and FRANK, 1983).

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