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BLASTOMYCOSIS: REPORT OF THREE CASES FROM ALBERTA WITH A REVIEW OF CANADIAN CASES

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Abstract

Approximately 120 cases of blastomycosis have been reported from Canada to-date. The great majority of these occurred in the Eastern provinces. Since 1970, three cases of blastomycosis have been seen in Alberta. The first case, with meningeal and pulmonary involvements, was diagnosed at post-mortem. The second case was that of a 75-year-old male with a history of pancytopenia, aortic arteriosclerosis, exposure to mercury, and fever. KOH and periodic-acid schiff (PAS) stained smears of the lung tissue, received after autopsy, showed numerous budding yeast cells of *Blastomyces dermatitidis* along with some hyphal filaments. Similarly, budding cells of *B. dermatitidis* and hyphal segments were observed in large numbers in the PAS and Gomori's methenamine-silver (GMS) stained sections made from adrenals, lung, kidney, and spleen tissues. Attempts to culture the fungus on a variety of selective and non-selective media were unsuccessful, due to heavy bacterial contamination. The indirect fluoroscent antibody results were 2+ with the *B. dermatitidis* conjugate. The third case was that of a 31-year-old male, who was admitted to the hospital with the chief complaint of chest pain. Biopsy tissue sections, stained with the GMS procedure revealed a few foci with *B. dermatitidis* yeast cells. The immunodiffusion and complement fixation (CF) tests gave positive results against *B. dermatitidis* antigen (titre, 1: 16). The CF titre declined following treatment with amphotericin B and the immunodiffusion test became negative after the institution of antifungal therapy. Except for the last patient, the other two patients had no history of travel in any known endemic areas. In addition to these cases, a survey of blastomycosis occurring in this country has been presented along with on the disease in dogs and a cat.

Introduction

Blastomycosis, caused by the dimorphic fungus *Blastomyces dermatitidis*, is endemic in the midwest, southeast, the Appalachian states, the basins of the Missouri valley and the states of Minnesota, North Dakota of the United States, fourteen African countries, and some parts of Canada (Quebec and Ontario) (1, 2, 36). The disease has also been reported from several Latin American countries, England and Switzerland (5); however, these areas are not considered to be endemic. We have no documented proof on the occurrence of blastomycosis in three of the four Western Canadian provinces (Saskatchewan, Alberta and British Columbia). However since 1970, three cases of blastomycosis have been seen in Alberta. These are described below, along with a survey of the Canadian cases of blastomycosis that have been reported to-date. The pertinent information on these cases is summarized in Table 2. Also included in this report are the cases of blastomycosis that have occurred in dogs and a cat since 1958 (Table 3).

Case reports

Case No. 1- In 1970, a 60-year-old male, who lived for 33 years in a township approximately 50 miles southeast of Edmonton, was admitted to the hospital in a state of confusion. Investigations indicated that he had meningeal manifestations of the disease and a history of granulomatous lesions of the upper left lung for six years. A detailed account of this case will be presented elsewhere (24).

Case No. 2- A 75-year-old male, who had been born in Scotland and had spent most of his life in Western Canada, was admitted to the hospital in March, 1975 with the chief complaint of weakness. The patient had been exposed to mercury while handling grains for 13 years in a grain

Table 1. Serological findings on the third case of blastomycosis.

Date	Serum No.	Test For	ID[1]	Procedure CF (titre)	Procedure LA
21 March, 1977	1	Aspergillosis	+*		
		Blastomycosis	–	+ (1:2; 1:16**)	–***
		Coccidioidomycosis	–	NR	
		Histoplasmosis	–	–	
4 April, 1977	2	Blastomycosis	+	+ (1:16)	
		Coccidioidomycosis	–	–	
		Histoplasmosis	–	–	
27 April, 1977	3	Blastomycosis	–	+ (1:16)	
2 May, 1977	4	Blastomycosis	–	+ (1:16)	
12 May, 1977	5	Blastomycosis	–	+ (1:8)	

* One antigen-antibody complex to *A. flavus* antigen.
** Trace reaction.
*** Commercial reagents of Hyland Laboratory: Division of Travenol Laboratories, Inc., Costa Meca, Californai 92626, U.S.A.
1 The reagents for aspergillosis, blastomycosis and histoplasmosis serology were prepared as described by Kaufman *et al.* 1972. Manual of Standarized Serodiagnostic Procedures for Systemic Mycoses. Part I: Agar Immunodiffusion Tests. Pan American Health Organization, Washington, D.C.
NR = Non-Reactive. The CF test for histoplasmosis was performed at the Provincial Laboratory of Public Health, The University of Alberta, Edmonton, Alberta. The C.F. tests for blastomycosis and coccidioidomycosis were performed at the Public Health Laboratory, Toronto, Ontario.

elevator, but there was no conclusive evidence of the patient having mercury poisoning. He had had no contact with mercury after 1970. Prior to his final admission in November, 1975, the patient developed an erythematous rash of unknown cause that covered his entire body. He had also developed a moderate aortic arteriosclerosis. From the day of his final admission to the hospital, the patient remained febrile (37–40.6 C) until his death on 2nd December, 1975. The temperature readings a day before his death were 36.4 to 38 C, and irregularities in pulse rates were recorded.

Laboratory Findings- Hemoglobin, 9.5–10.8 g. Platelet count, 57,000–98,000 down to 7,000 a day before the death; white blood cells, 400–1,600/mm^3 and decreased to 350/mm^3 a day before the death; urinalysis, 20 mg of protein per cent. The blood urea was elevated and ranged 29–47 mg/dl.

Radiology- A chest x-ray taken following the day of his final admission to the hospital revealed a diaphragm and heart within normal limits. Another x-ray done five days later, showed no convincing abnormality of the heart and lungs, except for basal markings which were slightly prominent and suggestive of a bronchitic process. A subsequent x-ray, taken after another six days, showed gross mottling in the lung with a pattern suggestive of pulmonary edema.

Cultures- Blood and urine cultures were negative for fungi and bacteria.

Histopathology- A bone-marrow biopsy section, stained with the Gomori's methenamine-silver (GMS) procedure, revealed many foci with the yeast form cells of *B. dermatitidis* in the necrotic areas (Fig. 1). The results were not reported until after the death of the patient.

Treatment- In July, he was treated with durabolin (nandrolone phenpropionate, 50 mg/week, i.m.) with no response. From 21st October to 17th November, 1975, he was put on depomedrom (methylprednisolone acetate, 500 mg) to increase his platelet count and also for the

Table 2. Summary of all known Canadian cases of blastomycosis except those herein reported from Alberta.

Case	No.	Age	Sex	Clinical details	Occupation RESULTS)	Province	Reference
1	(C)	28	Male	Involvement of the face, neck, shoulder, lower extremities, etc.	NG (TREATED)	ONTARIO	41
1	(C)	28	Male	Cutaneous lesions on the right wrist and the front of the neck	Gardner (TREATED)	ONTARIO	41
3	(C)	44	Male	Swelling of the right elbow	Farmer (TREATED)	ONTARIO	41
4	(D)	NG	Male	Abscess in the neck, spleen, kidney, etc.	NG (DIED)	ONTARIO	41
5	(S)	25	Male	Eruption on the nose and on the right side of the face; discharging sinus with bone involvement; lesion in the lower right lobe.	NG (DIED)	QUEBEC	41
6	(NG)	NG	NG	NG	NG	QUEBEC	41
7	(C)	48	Male	Sinus drainage	Labourer (TREATED)	QUEBEC	41
8	(C)	63	Male	Ulceration; facial lesion	Farmer TREATED)	QUEBEC	41
9	(C)	43	Male	Ulcerated lesion; headache; chills	Labourer (DIED)	QUEBEC	41
10	(C)	32	Female	Lesions on the nose	Housewife (NG)	QUEBEC	41
11	(NG)	NG	NG	NG	NG (NG)	QUEBEC	41
12	(NG)	NG	NG	NG '. . . a number of cases were seen." NOTE: The exact number was NOT given.	NG (NG)	QUEBEC	41
13	(D)	56	Male	Ulcer on the buccal surface and sinus; fever; night sweats; infiltration of the upper left lobe; loss of bone, etc.	Storekeeper (TREATED)	ONTARIO	41
14	(D)	11	Male	Weakness; cough; suppurating points; tumor development; bronchopneumonia (DIED)	NG (DIED)	QUEBEC	41
15	(C)	15	Male	Swollen left foot; lesion with discharging green pus; sore on on the back of the right leg and the right arm; weight loss; osteomyelitis.	NG (TREATED)	MANITOBA	41
16	(NG)	NG	Female	NG	NG (NG)	QUEBEC	41
17	(NG)	NG	Female	NG	NG	QUEBEC	41
18	(S)	48	Male	cough; weakness; loss of weight; fever; shortness of breath; mildly diabetic	Fruitpeddler (DIED)	ONTARIO	41

Case	No.	Age	Sex	Clinical details	Occupation RESULTS)	Province	Reference
19	(S)	40	Female	Slight coughs; hemoptysis; low grade fever; granulomatous ulcers on the right elbow and both the ankles	Housewife (DIED)	ONTARIO	41
20	(C)	60	Female	Pyogenic granuloma	NG (NG)	QUEBEC	27
21	(C)	39	Male	Ulcer of the right hand; swelling of the right side of the neck	Printer (TREATED)	ONTARIO	32
22	(C)	32	Male	Swelling of the right foot; right hand; cheek; left hand; both buttocks	NG Did not respond to radium treatment	ONTARIO	32
23	(C)	62	Male	Ulcers of the leg of 10-year duration	Storekeeper (NK)		
24	(C)	62	NG	Lesion on the right ear	NG (TREATED)	ONTARIO	32
25	(C)	28	Male	Lesion on the right elbow	NG (TREATED)	ONTARIO	32
26	(C)	64	Male	Lesion on the cheek	Farm Labourer (TREATED)	ONTARIO	32
27	(C)	28	Male	Chronic ulcerative lesion on the cheek	Motor mechanic (TREATED)	ONTARIO	32
28	(C)	69	Female	Hemoptysis; ulcer on the right cheek	NG (TREATED)	ONTARIO	32
29	(C)	17	Male	Ulceration of the right heel	Carpenter (NK)	ONTARIO	32
30	(S)	40	Male	Pulmonary osseous; cutaneous lesions	Miner (DIED)	ONTARIO	9, 3
31	(C)	75	Male	Lesions on the left upper and lower eyelids; on the right arm, etc.	Farmer (TREATED)	MANITOBA	11
32	(S)	68	Male	Aching; weakness; cough; flu-like syndrome; hemoptysis; cold sore	Engineer (DIED)	MANITOBA	11
33	(C)	40	Male	Mental disturbance	NG (DIED)	QUEBEC	13
34 to 37	(P × 4)	NG	NG	Pulmonary involvements	NG (NG)	QUEBEC	28
38 to 60	(C)	NG	NG	Cutaneous (22 Males and 1 Female) NOTE: Of these 23 cases, only 11 have been described in the literature.	NG NG (NK)	QUEBEC	14
61	(NG)	54	Female	NG	NG (NG)	QUEBEC	29
62 to 64	(NG)	NG	NG	NG	NG (NG)	QUEBEC	29

Case	No.	Age	Sex	Clinical details	Occupation RESULTS)	Province	Reference
65	(C)	46	Male	Involvement of the face, neck and thorax	NG (NG)	QUEBEC	35
66	(NG)	52	Male	NG	Shipyard worker (DIED)	QUEBEC	16
67	(NG)	37	Male	NG	Carpenter (TREATED)	QUEBEC	8
68	(NG)	53	Male	NG	Farmer (NG)	QUEBEC	21
69	(NG)	35	Male	NG	Worker (NG)	QUEBEC	21
70	(D)	40	Male	Low grade fever; chills; weight loss; marked anorexia; laboured respiration	NG (DIED)	QUEBEC	21
71	(S)	35	Male	Granulomatous patches on the face; right hand and soft palate; swelling of the scrotum and the penis; anorexia, etc.	Farmer (TREATED, *but* a relapse occurred)	QUEBEC	19
72	(P)	53	Male	Cough; weight loss; asthema; pain in the left chest; pulmonary infiltration; osteolysis of the 4th metacarpal of the hand.	Farmer (TREATED)	QUEBEC	19
73	(P)	36	Male	Slight hemoptysis; night sweats; mediastinal and dorsal pains	Construction worker (PRESUMABLY TREATED)	QUEBEC	19
74	(S)	39	Male	Left chest pain; low grade fever; productive cough; watery sputum production; draining sinus left knee	Machine operator (TREATED); First amphotericin B treatment in Canada	NOVA SCOTIA	17
75	(S)	46	Male	Enlargement of the left scrotal sac; loss of libido; dysuria; suprapubic pain; loss of weight; night sweats; cough; sputum production; general malaise; multiple cutaneous lesions	Truck driver (TREATED)	ONTARIO	43
76	(P)	34	Male	Pulmonary involvement	NG (PROBABLY TREATED)	QUEBEC	20
77	(P)	36	Male	Pulmonary involvement	NG (TREATED)	QUEBEC	20
78	(G)	73	Male	Generalized infection	NG (TREATED)	QUEBEC	20
79	(G)	36	Male	Generalized infection	NG (TREATED)	QUEBEC	20
80	(C)	43	Male	Lesion on the scalp	Book-keeper (worked for a mining company in Northwestern Ontario, near the Manitoba border) (TREATED, but a relapse occurred)	QUEBEC	15, 6
81 to 106		NG	NG	Cough; sputum production; hemoptysis; chest pain; asymptommatic; pulmonary involvement, etc.	Construction workers; farmer; student; trapper; housewife; policeman; engineer; horse trainer	MANITOBA	26, 11

Case No.	Age	Sex	Clinical details	Occupation RESULTS)	Province	Reference
107 (M)	59	Male	Headache; difficulty in walking for three weeks; cerebellar abscess	Lumberjack (DIED)	ONTARIO	30
108 to 115			Eight isolations of *B. dermatitidis* from sputum, bone-marrow and lung sources NOTE: It is not known whether these eight isolations represent eight different individuals or one case only but from different sites		ONTARIO	Fisher, J. B. 1975*

* Report from the Mycology Laboratory, Central Laboratory, Laboratory Centre for Disease Control, ed. J.E. Logan. Ph.D.
NG = Not given; NK = Not known; (C) = cutaneous; (D) = disseminated; (P) = pulmonary; (G) = generalized; (M) = meningeal; (S) = systemic

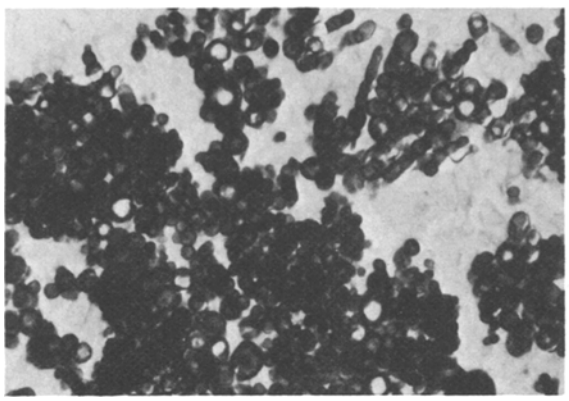

Fig. 1. Tissue section of bone-marrow showing double contoured, yeast cells of *B. dermatitidis* and some hyphal filaments (× 560; case No. 2).

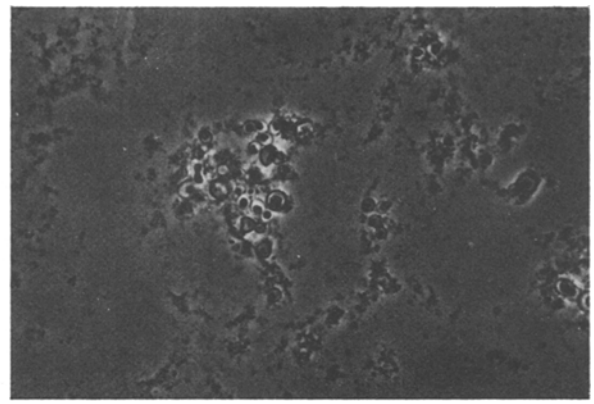

Fig. 2. KOH preparation of the lung tissue showing double contoured, budding yeast cells of *B. dermatitidis* (× 560; case No. 2).

treatment of pancytopenia. His hemoglobin rose as a result of the administration of the latter drug for four weeks and there were improvements in platelets during this treatment. In addition, he had received some quantities of hydrocortisone and antibacterial antibiotics. His condition did not improve and he died due to respiratory arrest.

Autopsy- Excised lung tissue was submitted for bacteriological and mycological examinations. Direct microscopic examination of the tissue for the presence of acid-fast bacilli was negative and as were cultures. However, KOH and periodic-acid schiff (PAS) stained smears, made from the ground lung tissue, showed budding yeast cells that were strongly suggestive of *B. dermatitidis* (Fig. 2), along with mycelial elements. Tissue sections of the lung, bone-marrow, adrenals, spleen, liver and heart, prepared by the GMS procedure, also showed the characteristic budding yeasts of *B. dermatitidis* in large numbers together with hyphal filaments (Figs. 1, 3). Attempts were made to isolate the fungus on Mycosel, phytone-yeast extract (BBL), cereal agars (39) and pharmamedium agar, but these were unsuccessful both at 25 and 37 C due to heavy contamination by bacteria.

Indirect Fluorescent Antibody Procedure- A 2+ reaction was recorded with the *B. dermatitidis* specific conjugate. The reaction with the conjugate specific for *Cryptococcus neoformans* was negative, and 4+ results were obtained when a screening conjugate for *Histoplasma capsulatum*, *B. dermatitidis* and other antigenically related fungi was used.

Case No. 3- This patient, a 31-year-old male, was first seen in the hospital in January, 1977, because of pain in the chest. He was treated with a variety of antibacterial antibiotics for suspected pneumonia. However, his condition did not improve and he was admitted again in the hospital for further investigation sometime in March. The chest x-ray taken following admission showed a dense right upper lobe infiltration and some pleural thickening. When asked about his travels, he indicated that he had been to southern California and to Toronto, Ontario. The patient was afebrile, did not have a productive cough or sputum, was clinically well. He had no skin or bone lesions.

Cultures- Cultures for bacteria or fungi on routine laboratory media were negative before and after the performance of fiberoptic bronchoscopy.

Histopathology- Tissue sections from the bronchoscopic

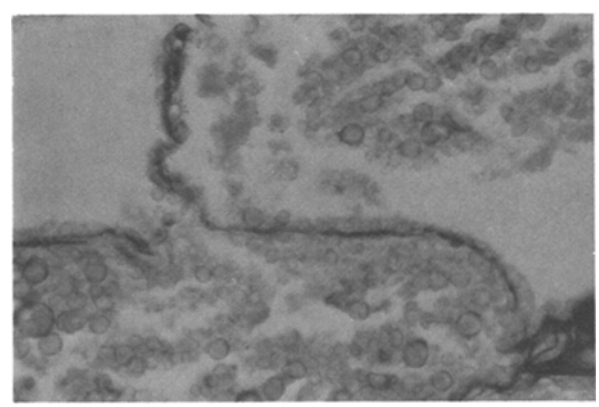

Fig. 3. Tissue section of lung (GMS) showing numerous yeast cells of *B. dermatitidis* (× 560; case No. 2).

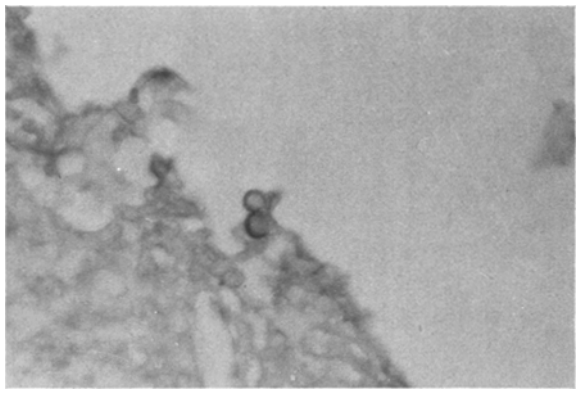

Fig. 4. Broad based budding yeast cells in the fiberoptic bronchoscopy biopsy tissue (GMS), strongly suggestive of *B. dermatitidis* (× 560; case No. 3).

material, stained with GMS, PAS and hemotoxylin and eosin procedures, were prepared. When examined microscopically, only the GMS preparations showed a few foci of budding yeast cells morphologically compatible with *B. dermatitidis* (Fig. 4).

Serology- The patient's serum was tested on five occassions to detect antibody (ies), if present, to a battery of *Aspergillus* species antigens, and also against *H. capsulatum*, *B. dermatitidis* and *Coccidioides immitis* antigens, using immunodiffusion, complement fixation (CF) and latex agglutination techniques (LA). The serological findings are presented in Table 1.

Treatment- When *B. dermatitidis* yeast cells were seen in the tissue sections from a biopsy, and positive serological findings for blastomycosis were obtained, treatment with amphotericin B was started. This apparently completely cured the infection.

Discussion

The first Canadian case of blastomycosis was reported by Primrose in 1906 (41), slightly over a decade after the disease had been first described in the United States by Gilchrist in 1894 (12). Since then, the total number of documented cases of blastomycosis in Canada is nearly 120 (see Table 2). This figure in some respects may not truly reflect the prevalence of this disease in this country. Starrs and Klotz (41) in their review, accepted only five of the 18 cases based on the proofs advanced for diagnosis. According to McKee (31), who did not present any new case but elaborated on blastomycotic infections, it appears that he had seen 'a number of cases', but no exact figure for such infections was given. This situation is complicated further by an article from Quebec (20) in which cases of published and unpublished blastomycosis were discussed. In view of these discrepancies, an attempt has been made

Table 3. Recorded Canadian cases of blastomycosis in dogs and a cat.

Case No.	Animal	Age	Sex	Clinical details	Province (Reference
1	Dog	NG	NG	NG	MANITOBA (18)
2	Dog	4-year	,,	Cough for four years (Fatal)	ONTARIO (4)
3	Dog	3-month	,,	Pulmonary involvement	ONTARIO (22)
4	Dog	4-year	,,	NG	ONTARIO (22)
5	Dog	NG	,,	Disseminated	ONTARIO (7)
6	Dog	NG	,,	,,	ONTARIO (7)
7	Dog	NG	,,	,,	ONTARIO (7)
8	Dog	NG	,,	,,	ONTARIO (7)
9	Dog	NG	,,	,,	ONTARIO (7)
10	Dog	NG	,,	Cutaneous	ONTARIO (7)
11	Dog	$3\frac{1}{2}$-year	,,	NG	ONTARIO
12	Dog	2-year	,,	Pulmonary; cellulitis; oesteomilitis	ONTARIO (40)
13	Dog	$1\frac{1}{2}$-year	,,	Cutaneous	ONTARIO (40)
14	Dog	NG	,,	Disseminated	SASKATCHEWAN*
15	Cat	NG	,,	NG	ONTARIO (10)

NG = Not given. * Personal communication (Dr. I. W. Geere).

to bring the data on the cases of blastomycosis as up-to-date as possible. It appears that their number may be much higher than that given above or from the information available in the literature. The authors fully agree with the points raised earlier that: (i) since mycotic infections are not in the category of notifiable diseases, they cannot be quantitated and any attempt to do so is bound to fail; (ii) whatever is being reported from any geographical areas or parts of the world indicates primarily the activities and interests of the investigators in that area rather than the true prevalence of the disease; (iii) whatever statistics are available on the mycotic infections, they merely represent a few peaks and crags of the 'medical mycological iceberg' (2).

The present study reveals that cutaneous type infections of blastomycosis are more prevalent (48 %) in Canada than the pulmonary (36 %), systemic (13 %) or meningeal (3 %) forms (Table 2). The consensus is that blastomycosis begins by the inhalation of fungus spores and that the disease may either be confined to the lungs or that it may spread to virtually any organ of the body (5, 37). It is also noted that infections are more common in males than females (ratio, 8: 1). The distribution of the cases summarized in Table 2 suggests that the disease predominantly occurs in Quebec (51.32 %) followed by Ontario (22.6 %), Manitoba (25 %), and Nova Scotia (0.88 %) (Fig. 5). With the occurrence of only a few cases in Alberta and Saskatchewan, it is somewhat premature to say that the disease may also exist in British Columbia. It might occur there but there has not been any documented proof yet. It is noteworthy that cases of blastomycosis in dogs and a cat have been reported more commonly from Ontario, but none from the neighbouring province of Quebec. Of the three Alberta cases, as stated above, the first one was undoubtedly of the meningeal and pulmonary type of blastomycosis. It should be mentioned here that the isolate from that case produced *B. dermatitidis* type conidia on cereal agar medium (25 C) and converted into yeast form (37 C) on brain heart infusion agar. However, it was an atypical isolate of *B. dermatitidis*, because its yeast-like cells showed a wide variation in size. Exoantigen studies carried out recently on this isolate in the presence of a reference antigen and anti- *B. dermatitidis* rabbit serum demonstrated two lines of identity. One was considered to be an 'A' type precipitin and other an unknown antigen-antiserum complex (Sekhon 1978, personal observations).

Fig. 5. Distribution of 115 Canadian cases of blastomycosis by provinces, a = Not included in Table 2; b = Personal communication (see discussion).

In the second case, the ante-mortem diagnosis was pancytopenia as well as tuberculosis. However, neither the direct microscopic findings nor cultural studies supported the diagnosis of tuberculosis. It was only after the death of the patient that *B. dermatitidis* was demonstrated in KOH wet mounts and PAS and GMS stained preparations made from lung tissues. Involvement with this fungus was confirmed by the indirect fluorescent antibody technique. The GMS and PAS sections from other organs (see above, p. 57) also showed yeast cells of *B. dermatitidis* in large numbers and some mycelial elements. It was unfortunate that, despite several attempts, the fungus could not be isolated because of heavy bacterial contamination.

KOH mounts and tissue sections demonstrated the presence of hyphal filaments (Figs. 1, 3), which is in accordance with the findings of Hardin and Scott (23). Usually, hyphal forms are not seen *in vivo* in blastomycosis.

The third case presented herein was clearly one of blastomycosis as supported by serological findings, the presence of budding yeast cells of *B. dermatitidis* in the biopsied tissue (Fig. 4), and the patient's response to treatment with amphotericin B. It is well known that sera from cases of blastomycosis may cross-react with *H. capsulatum*, *C. immitis* and *Paracoccidioides brasiliensis* antigens in the CF test (25). However, in this case, cross-reactions were not observed with the antigens of the first two fungi.

Epidemiological studies of blastomycosis suggest that

the disease most frequently occurs either in the known endemic areas or in individuals who traveled to the endemic areas. Quite likely the first and certainly the second of our cases do not come under either of the above two categories. It appears that the first two patients contracted their infections in Alberta and the third one acquired his disease while travelling in Ontario. The province of Saskatchewan may yet prove to be endemic for blastomycosis. It shares borders with North Dakota, where 61 cases of blastomycosis were documented in 1976 (33) and also with Manitoba where 23 % of the Canadian cases have been reported. In a personal communication Dr. I.W. Geere of Saskatchewan told of a case of blastomycosis in a patient who had never been outside of that province.

Acknowledgements

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The identity of the fungus present in tissue (case 2) was confirmed, using the indirect fluorescent antibody procedure, by Dr. William Kaplan, Assistant Director, Mycology Division, Centre for Disease Control, Atlanta, Georgia. The fiberoptic bronchoscopy (case 3) was performed by Dr. F.G. Buckle.

Zusammenfassung

Bis jetzt hatten wir umgefahr 120 Blastomycosis Fallen in Canada. Die waren meisten indie Ost Provinzen. Seit 1970, wirhatten nur 3 Blastomycosis Fallen Alberta gesehen. Der erste Fall war mit Meningismus und Lungen komplikationen, und war festgestellt durch die sektion. Der zweite fall war ein 75 jahre alter mann. Er hatte pancytopenia aortic arteriosclerosis, aussetzung zu queck-sieber und fieber. Das gewebe aus der lunge-was mit KOH und periodische saure schiff (PAS) farbt war-was wir nach der sektion bekommen haben hatte eine menge knospende hefe zellen von *Blastomyces dermatitidis* und noch welche hypha faden gehabt. Wirhaben die selbe knospende zellen von *B. dermatitidis* und hypha faden in grosser menge gesehen in den geweben von der Nebenniere druse, von der lunge, von der niere, und der milz – die waren gefarbt mit PAS und mit gomori's methenamine-silber (GMS). Die zuchtung der fungus in verschiedene boden war ohne erfolge, denn wirhatten grosse infizierung mit bakterien gehabt. Die indirekte fluoreszierende anti-korper resutat was + + mit *B. dermatitidis* konjugation. Der dritte fall war: ein 31 jahre alter mann. Er kam zum wazaret mit brustkasten schmerzen. Die gewebe von biopsie sektionen-gefarbt mit GMS technik zeigten wenige foci mit *B. dermatitidis* hefe zellen. Die untersuchungen mit die Immun-Difuss und complement fixieren (CF) gaben positive resutat gegen die *B. dermatitidis* antigen (titre, 1: 16). Der CF titer ist niedergegangen nach der kur mit amphotericin B und die Immun-Difuss untersuchung wurde auch negative nach antifungus therapie. Nur der letzte kranke fahrte durch eine endemische zone, die andere zwei manner waren niergenes. Neben den drei falle, der uberblick von blastomycosis in diesen lande ist mit der krankheit von hunden und katzen presentiert.

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