



EPIDEMIOLOGY BULLETIN

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Organic dust toxic syndrome

Hayrider's Lung Revisited

On December 15, 1979 a church-sponsored hayride took place in Tidewater, Virginia. Within 26 hours of the hayride, 17 of the 27 participants experienced an illness characterized by chest pain (94%), cough (94%), fever (88%), chills (88%), headache (82%), shortness of breath (41%), and myalgia (29%). The median incubation period was 14 hours. Thirteen were hospitalized, two sought outpatient medical attention, and two sought no medical treatment. Physical examinations were within normal limits except for documented fever. Chest x-rays performed on those hospitalized were essentially normal with two showing slightly increased, nonspecific interstitial markings. White blood cell counts performed on the same group revealed leukocytosis (range 10,100 to 21,000/mm³). The mean duration of illness was 2.6 days. Sputum specimens collected from seven patients were cultured for fungi and revealed a variety of organisms; *Penicillium* sp. (5 specimens), *Candida albicans* (5 specimens), *Chaetomium* sp. (4 specimens), *Trichoderma* sp. (2 specimens), *Aspergillus flavus* (one specimen), *A. niger* (one specimen). Serum specimens from all 17 patients were tested at the Centers for Disease Control for precipitins to *Aspergillus fumigatus*, *A. niger*, *A. flavus*, *Microsporysora faeni*, and the Farmer's Lung Panel (thermophilic actinomycetes) by immunodiffusion. No precipitins were detected.

The hayride was a Christmas caroling trip for members of a teen group. It was attended by 27 persons, four of whom were adult chaperones. In preparation for the hayride, the owner



of a large farm truck had obtained bales of hay from a neighbor. The bales were stacked against the sides of the truck bed with one bale broken and scattered in the aisle created by the bales. A tarpaulin was stretched over the truck bed from the truck's cab to the bed's end, leaving only the back end open.

Twenty-three persons rode all or part of the time in the truck bed, getting out for five to ten minutes at a time to sing carols at various residences. Two adult chaperones rode in the truck cab and the other two in a car following the truck. The hayride lasted for about two hours. According to hayride participants, the hay was noted to be moldy and fairly dusty. Participants also pointed out that horseplay broke out during the hayride, contributing to the amount of

airborne dust.

None of the individuals who rode in the truck cab or the car became ill. Seventeen (74%) of the 23 individuals who rode in the truck bed became ill. Those who sat near the rear of the truck bed (open end) had a lower attack rate than those who sat towards the enclosed front section (2/6 vs 15/17, $p=0.02$).

Hay specimens from the truck bed were cultured for fungi, revealing *Aspergillus wentii* and *Penicillium* sp.

Reported by Joseph L. Verdirame, M.D., Linda Presson, R.N., Louise Obici Memorial Hospital; Nancy Warren, Ph.D., Division of Consolidated Laboratory Services (DGS); Carl Root, M.D., Western Tidewater Health District; Melanie Cook, Betty

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Hayrider's Lung Revisited
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Rouse, Eastern Regional Office; and Carl Armstrong, M.D., Office of Epidemiology, Virginia Department of Health.

Editor's comment: At the time this outbreak was investigated, strong consideration was given to the diagnosis of hypersensitivity pneumonitis. Several clinical features made that diagnosis unlikely, however. First, the high overall attack rate of 63% was very unusual. Hypersensitivity pneumonitis usually occurs in sporadic cases (individual exposures); in group settings like the hayride, the attack rate is typically much lower (15%) than seen in this outbreak.¹ Second, none of the patients had precipitins against common antigens detectable in serum specimens. Finally, chest x-rays on most patients failed to demonstrate the typical interstitial reaction.

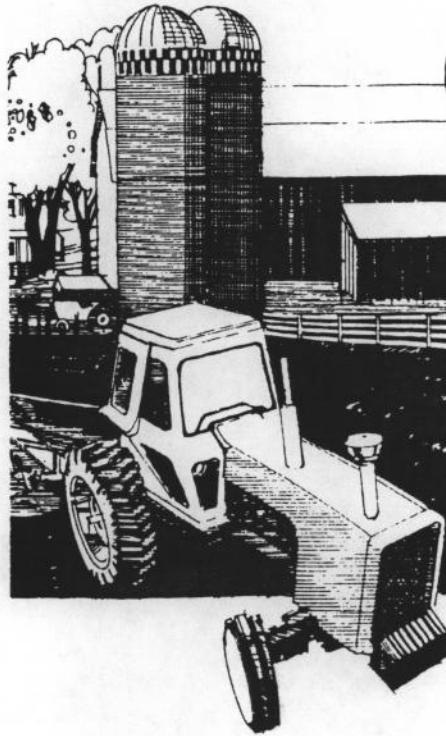
Although "precipitin-negative farmer's lung" had been previously reported,² there were few published reports of similar outbreaks in 1979. The pathogenesis of the syndrome was unclear and speculation centered on activation of the alternative pathway of complement or intoxication by inhalation of fungal mycotoxins.³⁻⁵

Since the Virginia outbreak, several additional reports have appeared and the syndrome is now well described, although its pathogenesis remains unknown. Various names have been attached to the syndrome including "silo unloader's syndrome" (to distinguish it from nitrogen dioxide-induced silo filler's disease),⁶ and "organic dust toxic syndrome" (ODTS), a generic label which does not prejudice the pathogenesis or exposure setting.⁷ Table 1 compares the features of ODTS with those of hypersensitivity pneumonitis.

A current hypothesis is that ODTS occurs when alveolar macrophages are overwhelmed following intense exposure to respirable microorganisms, leading to the recruitment of polymorphonuclear leukocytes and the release of inflammatory mediators.⁸ Symptoms of ODTS can be reproduced by the inhalation of endotoxin,⁹ and the syndrome closely resembles the "mill fever" described in cotton textile workers, "humidifier fever" in office workers, and "grain fever" in grain elevator workers.⁷

Treatment of ODTS is supportive; the illness is self-limiting and no

deaths have been reported. Prevention can be accomplished by storing hay and other organic matter in a way that limits fungal and bacterial multiplication. Moldy hay should not be used for recreational activities such as hayrides. When workers are unable to avoid intense exposure to organic dusts they should use appropriate respiratory protection.



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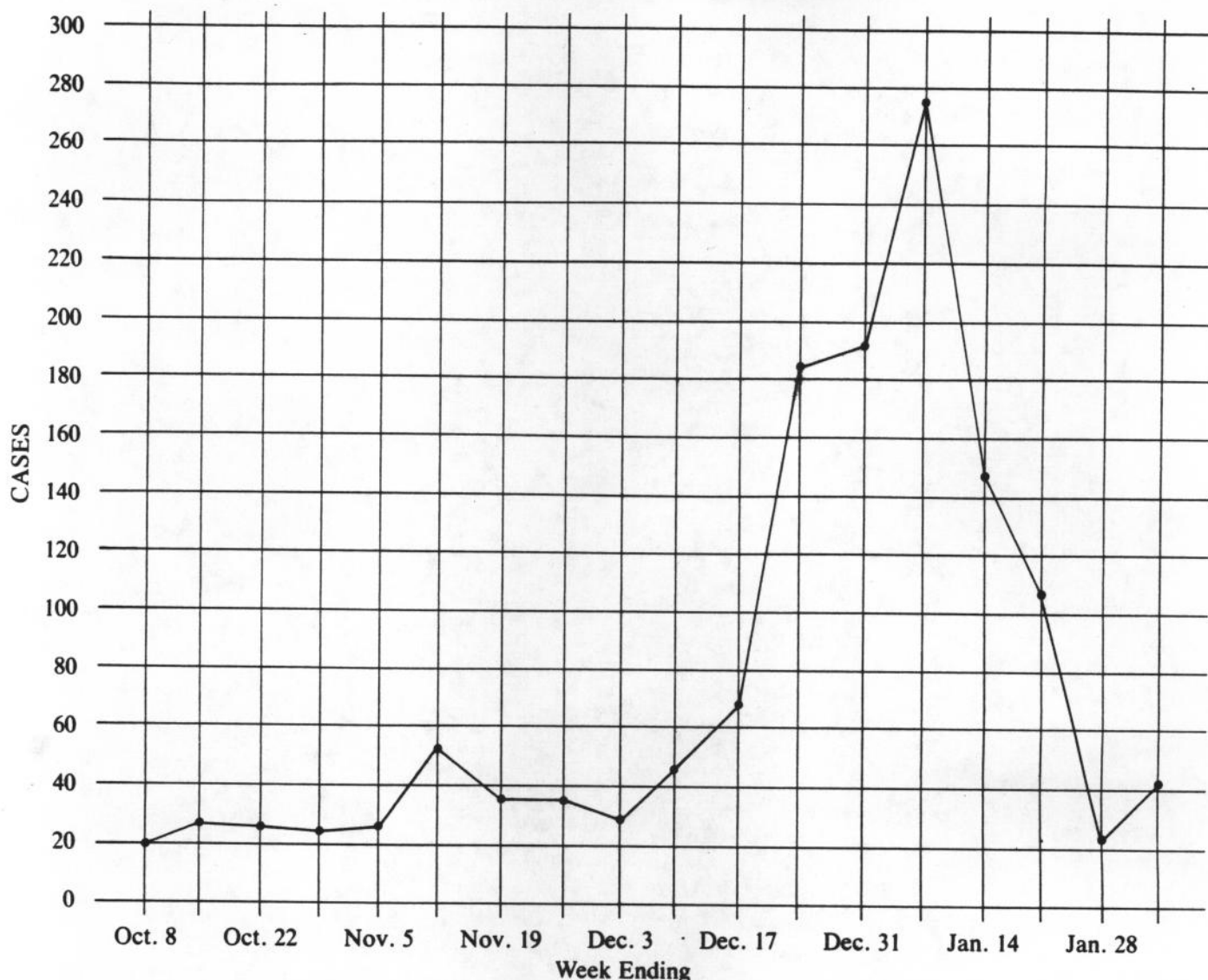
Table 1. Comparison of the Clinical Features of Organic Dust Toxic Syndrome and Acute Hypersensitivity Pneumonitis

	Organic Dust Toxic Syndrome	Acute Hypersensitivity Pneumonitis
Exposure intensity	Massive	Variable
Symptoms	Chills, fever, cough, myalgia	Chills, fever, cough, dyspnea
Attack rate*	High	Low
Incubation period	4-12 hours	2-9 hours
Breath sounds	Usually normal	Rales or normal
WBC count	Increased (PMN)	Increased (PMN)
Chest x-ray	Usually normal	Interstitial Infiltrates
Bronchial lavage	Many PMNs	Many lymphocytes
Lung biopsy	Acute inflammation and variety of microorganisms in airways	Granulomatous interstitial pneumonitis and bronchiolitis
Pulmonary function	Normal or mild restriction	Marked restriction, hypoxemia
Duration	Hours to days	Hours to days
Serology**	Usually negative	Usually positive (80%)
Progressive disease	None known	Can occur

*percentage of exposed individuals who became ill.

**precipitins to inhaled antigen detected by immunodiffusion.

Influenza Surveillance Virginia 1986-87



Influenza-like illness reports from 34 sentinel physicians reached a maximum level in early January. Most reports were from the Central and Northwestern Regions. Over ten isolates of influenza virus from around the state have been confirmed by the State Lab, all A/Taiwan/86 (H1N1), indicating that this virus was the probable cause of the outbreak. Based on these reports, influenza activity to date this season appears to have been both milder and earlier than activity in recent years. Surveillance will continue in case a "second wave" of activity occurs later in the season due to the same or a different strain of virus.

Serologic Testing for Rabies Titers

Although serologic testing after pre-exposure prophylaxis with human diploid cell rabies vaccine (HDCV) administered by either the ID or IM route is not necessary (see *Virginia Epidemiology Bulletin* 1987;87:4), serologic testing is still appropriate in lieu of a routine booster at two years. The possibility of an "immune complex-like" reaction in recipients of HDCV boosters makes it advisable to administer boosters only to those with a titer of $< 1:5$.

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Titers can be obtained by sending 2 ml of serum (packed on ice during warm weather) to:

Rapid Fluorescent Focus Inhibition Test

Department of Veterinary Diagnosis

Veterinary Medical Center
Kansas State University
Manhattan, KS 66506
(913) 532-5650

It is no longer necessary to make ar-

rangements by telephone. Charges presently are \$20.00 for a screen and \$25.00 if an end-point titer is desired.

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Cases of selected notifiable diseases, Virginia—for the period January 1, 1987 through January 31, 1987

Disease	State					Regions				
	This Month	Last Month	Total to Date		Mean 5 Year To Date	This Month				
			1986	1987		N.W.	N.	S.W.	C.	E.
Measles	0	0	0	0	2	0	0	0	0	0
Mumps	0	2	4	0	4	0	0	0	0	0
Pertussis	13	15	2	13	1	5	0	6	1	1
Rubella	0	0	0	0	1	0	0	0	0	0
Meningitis—Aseptic	11	21	18	11	15	3	0	5	2	1
*Bacterial	13	14	22	13	15	1	1	7	2	2
Hepatitis A (Infectious)	25	20	4	25	12	1	9	11	1	3
B (Serum)	40	42	24	40	38	5	8	12	11	4
Non-A, Non-B	5	7	2	5	6	0	2	2	1	0
Salmonellosis	80	71	67	80	72	6	19	8	25	22
Shigellosis	15	10	5	15	17	3	4	0	2	6
Campylobacter Infections	24	40	28	24	26	5	6	3	8	2
Tuberculosis	23	64	8	23	28	0	2	1	3	1
Syphilis (Primary & Secondary)	23	8	54	23	44	2	1	4	9	7
Gonorrhea	1564	1267	1279	1564	1541	—	—	—	—	—
Rocky Mountain Spotted Fever	0	0	0	0	0	0	0	0	0	0
Rabies in Animals	18	11	6	18	18	7	8	0	3	0
Meningococcal Infections	10	8	2	10	4	1	2	1	1	5
Influenza	326	355	14	326	14	121	3	24	55	123
Toxic Shock Syndrome	0	1	2	0	1	0	0	0	0	0
Reyes Syndrome	0	0	0	0	0	0	0	0	0	0
Legionellosis	1	4	3	1	1	0	0	1	0	0
Kawasaki's Disease	0	3	3	0	2	0	0	0	0	0
Acquired Immunodeficiency Syndrome	19	15	21	19	—	1	7	2	5	4

Counties Reporting Animal Rabies: Clarke 1 racoon, 1 fox; Fairfax 1 racoon; Fauquier 2 racoons; Fredericksburg 1 racoon; Hanover 1 cat, 1 racoon; Henrico 1 racoon; Loudoun 6 racoons; Prince William 1 racoon; Rockingham 1 skunk; Shenandoah 1 racoon.

Occupational Illnesses: Asbestosis 38; Pneumoconiosis 24; Carpal Tunnel Syndrome 12; Hearing loss 6; Mesothelioma 2; Silicosis 1.

*other than meningococcal

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