PROCEEDINGS

OF THE

SOCIETY FOR EXPERIMENTAL BIOLOGY AND MEDICINE

VOL. 31. MAY, 1934. No. 8.

Illinois Section.

Northwestern University Medical School, April 3, 1934.

7362 P*

Experimental Bronchogenic Pyogenic Lung Abscess.

W. E. ADAMS

From the Department of Surgery, University of Chicago.

In a previous communication[1] a method was described for producing bronchogenic lung abscess with human tubercle B. The present report is on the production of bronchogenic lung abscess in dogs by the same method, using pyogenic organisms.

Thirteen dogs were narcotized with morphine sulphate and divided into 2 groups. In each of the first 7 dogs, 0.25 cc. of a suspension of a mixture of *Streptococcus hemolyticus* and *Staphylococcus aureus* in lipiodol was deposited in the peripheral portion of the right lower lobe. In 2 of this group a similar amount was also placed in the left lower lobe. This was accomplished by means of a ureteral catheter introduced through a bronchoscope. The procedure was carried out under fluoroscopic control, thus the deposit could be made at any desired location. In each of the second 6 dogs 0.25 cc. of a broth suspension of *Streptococcus hemolyticus* and *Staphylococcus aureus* was deposited in the peripheral portion of

* P represents a preliminary, C a complete manuscript.

[1] Adams, W. E., PROC. SOC. EXP. BIOL. AND MED., 1933, **30**, 483.

the right lower lobe. A similar amount of lipiodol was placed in the peripheral portion of the left lower lobe.

Results. Group I. Three dogs were sacrificed on the 12th post-infected day. All presented indurated areas 1.5 to 2.5 cm. in diameter, one of which contained a cavity 0.33 cm. in diameter, and another a cavity of 1.0 cm. in diameter, each with a necrotic lining. The results in the other dogs are summarized in Table I. *Staphylococcus aureus* was cultured from one of the 2 cavities in animal 232.

TABLE I.
Bronchogenic Pyogenic Lung Abscess.

	Experiment			Results	
Dog	Lower lobe Involved	Material Injected (¼ cc.)	Days Duration	Indurated Area	Abscess Cavity
86	R.	Strep. and Staph. in lipiodol	12	2.5 cm.	1.0 cm.
93	R.	"	12	2.5 cm.	None
116	R.	"	12	1.5 cm.	0.33 cm.
167	R.	"	16	2.5 cm.	1.0 cm.
233	R.	"	16	None	None
	L.	"	16	None	None
232	L.	"	28	2.5 cm.	1.5 x 2.0 cm.
	R.	"	28	3.0 cm.	2.0 cm.
231	R.	"	28	2.5 cm.	1.0 cm.
244	R.	Strep. and Staph.	14	0.5 x 1.0 cm.	None
	L.	Lipiodol	14	None	None
254	R.	Strep. and Staph.	15	None	None
	L.	Lipiodol	15	None	None
281	R.	Strep. and Staph.	15	0.5 x 1.0 cm.	None
	L.	Lipiodol	15	0.5 x 1.0 cm.	None
237	R.	Strep. and Staph.	26	Very slight scarring	None
	L.	Lipiodol	26	Very slight scarring	None
243	R.	Strep. and Staph.	26	None	None
	L.	Lipiodol	26	None	None
248	R.	Strep. and Staph.	26	None	None
	L.	Lipiodol	26	None	None

Group II. One dog was sacrificed on the 14th post-infected day, 2 on the 15th and 3 on the 26th day. All lobes in which lipiodol had been deposited appeared normal except in one of the 15-day dogs. Here there was a slightly indurated area 0.5 x 1.0 cm. in dimension. All lobes in which micro-organisms had been placed appeared normal except the 14-day animal and one of the two 15-day dogs. In each of these a small indurated area 0.5 cm. in diameter was found, containing no cavity. In the 14-day animal, indurated areas were also noted in the right middle and right upper lobes. Microscopic sections through the indurated areas revealed infiltration with lymphocytes, endothelial cells and a few polymorphonuclear leucocytes.

The unsuccessful attempts to produce bronchogenic lung abscess in dogs[2, 3, 4] have been attributed to the efficiency of the cough reflex in the removal of foreign substances from the lungs. This factor was eliminated by maintenance of localization of the infective organisms with a heavy viscid media. Thus abscess formation was the usual result. It is not unlikely that maintenance of localization of pathogenic organisms occurs more readily in man than in dogs.

7363 P

Studies on Small Colony Variants of Staphylococcus Aureus.

EDITH L. SWINGLE. (Introduced by S. A. Koser.)

From the Department of Hygiene and Bacteriology, University of Chicago.

Small colony variants of bacteria are regarded by some investigators as a filterable stage in a life cycle of the organisms. Other workers do not feel that there is sufficient evidence in support of this theory. Hadley[1] has been one of the chief exponents of the idea that bacterial variation represents a cyclical development of the organisms and in this connection he described a small colony filterable form of the Shiga dysentery bacillus and other bacteria.

In the present investigation small colony variants of *Staphylococcus aureus* were studied with respect to their occurrence, morphology, physiological and antigenic properties and filterability. The variants were obtained by plating ageing broth or agar cultures and from cultures in lithium chloride broth. Their occurrence was irregular and rare and no means were found by which this type of variation could be induced. Tiny colonies were not observed at any time in very young cultures except occasionally in broth containing lithium chloride. They appeared only after the cultures had aged for a week or two and were more numerous after 3 or 4 weeks.

Well-isolated colonies of *Staph. aureus* are usually from 1 to 2 mm. in diameter when grown on nutrient agar. Those of the small colony variants could scarcely be discerned without the aid of a microscope. In the various strains they ranged from .04 mm., the smallest ever observed, to 0.5 mm., but most frequently they were

[2] Cutler, E. C., and Schlueter, S. A., PROC. SOC. EXP. BIOL. AND MED., 1926, **23**, 266.

[3] Schlueter, S. A., and Weidlein, I. N., *Arch. Surg.*, 1927, **14**, 457.

[4] Allen, D. S., *Arch. Surg.*, 1928, **16**, 179.

[1] Hadley, P., Delves, E., and Klimek, J., *J. Infect. Dis.*, 1931, **48**, 1.