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DEPARTMENT OF THE ARMY
Fort Detrick
Frederick, Maryland

TEST REPORT NUMBER 715 OF TEST STATION 53

/Following is a translation of a German-language document issued by Test Station 53 of the Armed Forces of the Federal Republic of Germany (Bundeswehr), 3042 Munster-Lager, Germany, telephone Munster-Lager 2831/583, dated 26 June 1963./

Testing Assignment

Subject: Sampling Equipment for Biological Warfare Agents. Comparison Between:
1. Sampling Kit for Biological Agents, of the Firm Bartels & Rieger, Cologne, and
2. US Sampling Kit, Biological Agent, Equipment Set E 25 R 2.

Reference:
1. Testing Assignment PT 356 - PT III 1 - 41/P 1174/001/2, dated 2 July 1962
2. Testing Assignment PT 357 - PT III 1/01/4272 - 102/2, dated 28 June 1962
3. Test Report Number 699 of Test Station 53, dated 30 May 1963
4. Test Report Number 712 of Test Station 53, dated 14 June 1963
5. Letter from BWB Coblenz, dated 9 April 1963, to Federal Ministry of Defense T III 7 (Doc Log No PT III 2 - P 1174/59 A)

Reporting: Doctor of Medicine and Veterinarian von Sprockhoff

Test Report Number 715 of Test Station 53 - V 16/63
(1st Comparison Report)

The Dräger pump of the German sampling equipment and the vacuum pump of the American kit are suitable for taking air samples for the purpose of testing for germ content.

The US device has several advantages over the German device, however, these being:

1. Greater capacity (approximately 184 ml air per second (or less than one second), as compared to 100 ml per 10-12 seconds)

2. Its simpler operation requiring less expenditure of energy

3. The very probable longer life of the germs due to their transfer from the dry to the liquid phase.

/s/ Dr Buttler
/t/ Dr Buttler

/s/ Sprockhoff
/t/ Dr v. Sprockhoff

/s/ Kramer
/t/ Kramer

Bundeswehr Testing Station 53 3042 Munster-Lager, 26 June 1963

Doc Log No V1 - 72 - 22 - 66 - 65 Tel: Munster-Lager 2831/583

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Reporting: Doctor of Medicine and Veterinarian von Sprockhoff

A) Equipment Tested:

1. Sampling equipment for biological warfare agents of the firm Bartels & Rieger, Cologne, and
2. US Sampling kit, biological agent, equipment set E 25 R 2.

B) Purpose of Test:

The test is to yield a comparison between the two sets of equipment.

C) Conduct of the Test:

The comparison tests consisted of the examination of experimentally produced Serratia marcescens aerosols with the help of the German Dräger pump and the vacuum pump component of the American equipment.

Additional details on the breeding of the test germ Serratia marcescens ("Bacterium prodigiosum"), on producing

the aerosol with the Piccolo device of the firm C. Heyer, Bad Ems, and on the filtration can be found in the two test reports referenced above (see references 3 and 4).

The time intervals of the samplings can be seen from the record, which are not included in this report. Continuous sampling was conducted.

D) Results of Tests:

The tests results for both sets of equipment are compared in Tables 1-3. In all tests, the individual samples are numbered serially as well as -- for simpler comparison with the corresponding sample numbers in the tables of the test reports referenced above -- individually.

The results can be evaluated in the following sense:

Test 1: Very good agreement in the number of germs identified

Test 2: Also very good agreement in the samples taken during the fogging. After the fogging, identification of germs with the Dräger pump was initially good, later -- corresponding to the increasing sedimentation of the bacteria -- quite limited. Only scattered Serratia germs could be detected with the US pump after termination of the fogging.

Test 3: Dräger pump -- only a few or no germs at all detected
US pump -- initially, considerably more bacteria detected than with the German pump with approximately equal volumes of air, later only scattered germs or none at all.

Test 4: Relatively good agreement on all samples

Test 5: Very good agreement on all samples.

Test 6: Dräger pump -- initially, during the fogging, many germs; later, after termination of the fogging, few to scattered Serratia bacteria detected
US pump -- on the whole, numerous bacteria detected and almost always more than with the German equipment.

Table 1. Results of Tests 1 and 2.

Test 1							Test 2						
Sample No.	Taken With:		German pump		US pump		Sample No.	Taken With:		German pump		US pump	
	Drager pump	US pump	Air 1	Agar Colonies	Air 1	Agar Colonies		Drager pump	US pump	Air 1	Agar Colonies	Air 1	Agar Colonies
1	1			complete coverage			1		1			10	complete coverage
2		1			10	complete coverage	2	1		2	complete coverage		
3	2		2	complete coverage			3		2			1.8	complete coverage
4		2			10	complete coverage	4	2		1	complete coverage		
5	3		5	complete coverage			5		3			0.9	complete coverage
6		3			20	complete coverage	6	3		0.5	complete coverage		
7	4		5	complete coverage			7		4			0.18	complete coverage
8		4			1.8	complete coverage	8	4		0.1	complete coverage		
9	5		1	complete coverage			9		5			0.9	complete coverage
10		5			1.8	complete coverage	10		6			0.9	complete coverage
11	6		2	complete coverage			11		7			0.18	complete coverage
12		6			9.2	complete coverage	12	5		1	complete coverage		
13		7			0.9	complete coverage	13	6		0.1	complete coverage		
14	7		2	complete coverage			14	7		0.1	complete coverage		
15		8			5	complete coverage	15	8		0.5	complete coverage		
16	8		1	complete coverage			16	9		0.5	complete coverage		
17		9			0.9	complete coverage	17	10		0.1	220		

14	7		2	complete coverage			14	7		0.1	complete coverage		
15		8			5	complete coverage	15	8		0.5	complete coverage		
16	8		1	complete coverage			16	9		0.5	complete coverage		
17		9			0.9	complete	17	10		0.1	220		
18	9		1	complete coverage			18		8			0.18	2
19	10		3	complete coverage			19	11		0.2	130		
20		10			1.8	ca. 750	20		9			0.18	0
21	11		1	complete coverage			21	12		0.5	129		
22		11			5	95	22		10			0.9	3
23	12		5	complete coverage			23	13		1	34		
							24	14		0.1	6		
							25	15		0.5	6		
							26	16		1	7		
							27		11			5	2

GC = ca. $4 \cdot 10^8$

GC = ca. $1 \cdot 10^8$

Samples taken during aeriation:

German pump 1-10 US pump 1-9 German pump 1-8 US pump 1-7

Samples taken following aeriation:

German pump 11-12 US pump 10-11 German pump 9-16 US pump 8-11

GC = Germ count in 1 ml bacteria concentrate
☆ = Marks line dividing samples taken during and after aeriation

Table 2. Results of Tests 3 and 4.

Test 3							Test 4						
Sample No.			German pump		US pump		Sample No.			German pump		US pump	
Taken With:							Taken With:						
	Drager pump	US pump	Air 1	Agar Colonies	Air 1	Agar Colonies		Drager pump	US pump	Air 1	Agar Colonies	Air 1	Agar Colonies
1		1			0.18	183	1		1			0.18	complete coverage
2	1		0.1	4			2	1		0.1	900		
3	2		0.5	12			3		2			0.9	complete coverage
4	3		0.1	1			4	2		0.5	560		
5		2			0.18	65	5		3			0.9	ca. 4100
6	4		0.1	2			6	3		1	510		
7		3			1.8	0	7		4			0.18	102
8		4			5	1	8	4		0.2	20		
9	5		0.5	2			9		5			0.9	331
10		5			5	0	10	5		1	183		
11	6		[illegible]	0			11		6			3.7	170
12		6			0.9	0	12	6		1	30		
13	7		[illegible]	3			13		7			[illegible]	150
14		7			5	0	14	7		2	25		
15	8		1	0			15		8			5	179
16		8			5	1	16	8		1	40		
17		9			10	0	17		9			5	40
18		10			5	0	18	9		2	20		
19	9		2	0			19		10			10	14
20		10			10	4	20	10		2	12		

11	6		[illegible]	0			11		6			3.7	170
12		6			0.9	0	12	[illegible]		1	30		
13	7		[illegible]	3			13		7			[illegible]	150
14		7			5	0	14	7		2	25		
15	8		1	0			15		8			5	175
16		8			5	1	16	8		1	40		
17		9			10	0	17		9			5	40
18		10			5	0	[illegible]	9		2	20		
19	9		2	0			19		10			10	14
20		11			[illegible]	4	20	10		2	12		
							21		11			20	5
							22	11		4	14		

GC = ca. $6.6 \cdot 10^{9}$

GC = ca. $6 \cdot 10^{13}$

Samples taken during aeriation:

German pump 1-2 US pump 1 German pump 1-3 US Pump 1-3

Samples taken following aeriation:

German pump 3-9 US pump 2-11 German pump 4-11 US pump 4-11

Table 3. Results of Tests 5 and 6.

Test 5							Test 6						
Sample No.	Taken With:		German Pump		US Pump		Sample No.	Taken With:		German Pump		US Pump	
	Drager pump	US pump	Air l	Agar Colonies	Air l	Agar Colonies		Drager pump	US pump	Air l	Agar Colonies	Air l	Agar Colonies
1		1			0.18	ca. 1500	1	1		0.1	4		
2	1		0.1	complete coverage			2	2		0.5	17		
3		2			0.9	ca. 1630	3	3		1	121		
4	2		0.5	complete coverage			4		1			0.9	complete coverage
5		3			1.8	complete coverage	5	4		1	complete coverage		
6		4			0.9	complete coverage	6		2			3.7	complete coverage
7		5			5	complete coverage	7		3			0.9	141
8	3		2	complete coverage			8	5		0.5	9		
9		6			5	complete coverage	9		4			1.8	18
10	4		0.5	complete coverage			10	6		1	11		
11	5		1	complete coverage			11		5			5	42
12	6		2	complete coverage			12	7		0.1	3		
13		7			0.9	complete coverage	13	8		0.5	2		
14	7				1	complete coverage	14	9		1	9		
15		8			1.8	complete coverage	15		6			1.8	765
16	8		2	complete coverage			16	10		0.5	5		
17		9			5	complete coverage	17		7			0.18	71
18		10			10	complete coverage			8			0.9	2
19		11			20	ca. 2240			9			1.8	7
20	9		4	complete coverage			21	11			3		
							21		10			10	234

11	5		1	complete coverage			11		5			5	42
12	6		2	complete coverage			12	7		0.1	3		
13		7			0.5	complete coverage	13	8		0.5	2		
	7				1	complete coverage	14	9		1	9		
15		8			1.8	complete coverage	15		6			1.8	765
16	8		2	complete coverage			16	10		0.5	5		
17		9				complete coverage	17		7			0.18	71
18		10			10	complete coverage			8			0.9	2
19		11			20	ca. 2240			9			1.8	7
20	9		4	complete coverage			20	11			3		
							21		10			10	234
							22	12		2	2		
							23		11			5	ca. 4
							24	13		1	5		

GC not determinable ($> 10^{13}$)

GC not determinable ($> 10^{13}$)

Samples taken during aeriation

German pump 1-7 US Pump 1-7 German pump 1-4 US pump 1-2

Samples taken following aeriation

German pump 8-11 US pump 8-11 German pump 5-13 US pump 3-11

E) Discussion:

A comparison of the test results indicates the suitability of the German Dräger pump and the American vacuum pump for taking air samples and detecting the germs contained therein, under the conditions prevailing during these tests. A good to very good agreement can be noted in Tests 1, 4 and 5.

Of the remaining tests, part speak in favor of the German, part in favor of the US pump. The reasons for these discrepancies is perhaps to be found in several factors. First, the method of functioning of the two pumps is different. The Dräger pump filters the air through dry membrane filters; the germs collect on the surface and in the pores of the filter and can grow after making contact with a nutrient medium. The method of air sampling with the US device is based upon the Impinger effect. The vacuum pump draws the germs through fine slots located in the side walls of plastic containers in which a liquid (nutrient bouillon, salt solution or the like) is held. They are thus transferred from the dry into the liquid phase.

Secondly, since all the tests were conducted in an improvised chamber set up in an air shaft in the laboratory, various convection or electrostatic conditions which cannot be more closely defined at the present time might have had their effects. Uncertainties of this type can only be eliminated when working with a special aerosol chamber. It is planned that such a chamber will be secured in the future, and the tests reported here might then be repeated.

Advantages of the American equipment, certainly, are the high pump capacity of ca. 184 ml air per revolution, the ease of operation of this vacuum pump and the utilization of the Impinger effect in the form of a transfer of the germs from the dry to the liquid phase. The latter feature, as indicated by other experiments (Goetz, Albrecht), provides greater probability of survival of the germs. Furthermore, the germ-seeded liquid can be placed on several types of nutrient carton in order to bring about a differentiation of the isolated germs.

These points seem to indicate the advisability of using the US vacuum pump for the examination of aerosols and germ-laden air, as well as water and surface samples.

The immediate contact with a nutrient medium is also advantageous for furnishing an early favorable environment for the microorganisms if brooding in an incubator is to take place and this also enables a more rapid diagnosis than in the case of the possible lengthly transfer from the sampling site to the laboratory, as is envisaged with the German equipment.

One possible source of difficulty must be mentioned, however. It is very possible that the material to be sampled (air, surface material) might be contaminated with ubiquitously distributed microorganisms (cf. Test 5) such as Proteus vulgaris, Bacillus mesentericus, Bacillus subtilis, etc. In this case, the immediate processing of the samples by transfer into the liquid phase might be accompanied by a disturbance in the germ differentiation due to the inundation with foreign germs. It should be possible to eliminate such circumstances, however, by adding germ-inhibiting substances (inhibition of swarming bacteria such as Proteus, Pseudomonas and Clostridia) in the form of surface-active materials (Pril, Rei, Paranitrophenylglycerine) suggested by the authors Döll and Beer; also by addition of antibiotics (i.e., streptomycin as an inhibitor of Gram-negative and Penicillin as an inhibitor of Gram-positive bacteria, Nystatin as an inhibitor of fungus).

F) Summary:

The Dräger pump of the German sampling equipment and the vacuum pump of the American equipment are suitable for taking air samples to examine their germ content.

The US equipment, however, has several advantages over the German equipment. These consist

(1) of the greater capacity (ca. 184 ml air/1 or second compared to 100 ml in 10-12 seconds);

(2) of the simpler -- i.e., energy saving operation; and

(3) very probably longer or better chance of life for the germs due to the transfer from the dry to the liquid phase.

G) Bibliography:

Albrecht, J: "Methods of Identification of Microorganisms in Aerosol Form," Zeitsschrift für Aerosolforschung (Journal of Aerosol Research), Vol 7, 1958, pages 1-12.

Beer, J: "A New Chemical Agent Which Inhibits the Swarming of Bacteria, PN PG/1," Zentralblatt für Bakteriologie (Central Bulletin on Bacteriology), I Original, Vol 171, 1958, pages 195-200.

Döll, W: "Additional Experiments on Inhibition of Swarming of Proteus Bacteria Through Substances Which Lower Interface Tension," Zentralblatt für Bacteriologie (Central Bulletin of Bacteriology), I Original, Vol 171, 1958, pages 151-152.

Goetz, A: "Basic Problems in the Detection of Microbiological Air Pollution," American Industrial Hygiene Association Quarterly, Vol 16, 1955, pages 113-120.

/s/ Sprockhoff
/t/ Dr v. Sprockhoff