Sabalette, R., Dominguez, M., and Iglesias, R. (1947). *Med. Colonial, Madrid,* **9,** 207. (Abstract—*Trop. Dis. Bull.,* **44,** 664.)

Sofiev, M. S., and Leitman, M. Z. (1946). *Med. Parasit. and Parasit. Dis., Moscow,* **15,** 81. (Abstract—*Trop. Dis. Bull.,* 1947, **44,** 906.)

[Two batches of squashed ticks from Kashmir (not sent by Colonel Kaul), examined by the Serologist to the Government of India, failed to give reaction for human blood. It was later ascertained that they had been collected from animal houses only. They gave reaction for blood of ruminant animals.—Editor, *I.M.G.*]

PENICILLIN AS AN AGENT FOR PURIFYING SMALLPOX VACCINE (CALF PROPAGATED VACCINIA VIRUS)

By N. K. ROY, M.B., D.P.H.
MAJOR, *ex*-I.M.S.
Director, C. P. Vaccine and Public Health Institute, Nagpur

Within recent years, a great deal of attention has been given to the production of smallpox vaccine free of micro-organisms. Attempts so far made in this direction have not, however, led to the desired result owing to the varying nature of the cultivation of the virus of vaccinia on the open skin surface of the calf. Indeed, this shortcoming of calf propagated vaccinia virus has led to the development of methods for the production of bacteria-free vaccinia virus in tissue culture and in the developing chick-embryo. Attempts to free the calf propagated vaccinia virus of all associated micro-organisms have been made in the past mainly by means of suitable chemicals, although physical agents such as *x*-rays have also been employed by Levin (1935). The main difficulty in the matter of purification of calf lymph vaccine has been that immunity to smallpox or its allied disease can be conferred, it appears, only by living virus. Attempts to induce immunity with inactivated virus (heated or treated with chemicals) have not been attended with much success (Parker and Rivers, 1936), though this is ascribed by Smith *et al.* (1948), to some extent, to the difficulties of obtaining preparation of sufficient virus concentration. These authors claim that completely inactivated virus in sufficient concentration may be effective in some instances. Various methods of purification of vaccinia virus that are in vogue are not reliable in freeing the lymph, particularly freshly prepared lymph, entirely of contaminants without reducing its potency.

In this Institute, however, penicillin is used with satisfactory results, as an agent for purifying glycerinated calf lymph vaccine. Records of recognized tests for purity and potency of penicillin-treated vaccine lymph, together with records of results achieved, show conclusively that penicillin is a potent and reliable agent in freeing the lymph entirely of the commonly occurring extraneous organisms, provided the lymph does not contain organisms such as *B. coli* which are not susceptible to penicillin and spores of spore-bearing ærobes and anærobes. If *B. coli* is found as a contaminant of calf lymph vaccine, the only way to get rid of it is to store the lymph for a considerable time at a temperature below —10°C. Bacteriological tests of hundreds of lymph numbers in this Institute have not however revealed the presence of this organism as a contaminant in any of the samples, although this does not mean that routine test need not be done on this account for the detection of the organism in vaccine lymph. Similarly the spores of Gram-positive spore bearers are not affected by penicillin (although their vegetative forms are susceptible to it).

As queries are being received by the author regarding the exact method of purifying calf lymph vaccine by means of penicillin, the technique followed in this Institute is described below for the information of those interested in the subject.

Technique

Before going into the details of the actual process of treating vaccine lymph with penicillin, it is considered essential to stress at the outset that whatever method of purification is followed, the importance of rigid sanitation at every stage of preparation of vaccine cannot be over emphasized.

The vaccine pulp collected in sterile, tared glass phials from calves 120 hours after inoculation is weighed and stored in the freezer to await processing. Twenty-four hours after collection from calves, the frozen pulp is passed successively through two sets of sterile mechanical lymph grinding machines for coarse and fine grinding, and is ground to a smooth consistency with the addition of sterile 50 per cent re-distilled glycerine in distilled water. The grinding machines used in this Institute are Baird and Tatlock's coarse grinding laboratory mill, Felix-Fluck triturating machine (Lausanne) and Doring lymph grinding machine; recently a Waring Blender has also been introduced. The glycerine used is chemically pure, free from mineral acids and has a sp. gr. of 1,260 as originally advocated by Copeman (1899) and a pH of 7. pH 8 is more destructive to vaccinia virus than pH 6 or 7. Therefore, 50 per cent glycerine and water mixture before sterilization is titrated with sodium bicarbonate to adjust the pH to 7.4 to remove any acid reaction which is destructive to the virus. After sterilization by autoclaving, the pH becomes 7.2.

The finely ground lymph is further mixed with 50 per cent glycerine and water mixture to make a dilution of 1 to 2 and this mixture is tested for purity and potency. The detection, with confirmation, by animal inoculation of *B. anthracis* and *Cl. tetani* is the cause for

rejection of the lymph at this stage. If found free from these organisms phenol is added to lymph in 0.75 per cent strength and the lymph is stored in the freezer at —12°C. Depending upon the urgency of demands, usually after six weeks to about six months of such storage in the cold, this lymph is finally diluted 1 to 4 by the addition of further quantities of 50 per cent glycerine and water mixture containing the requisite dose of penicillin. The final concentration of phenol in the purified lymph is 0.44 per cent; phenol is found useful in preventing the growth of moulds which are not affected by penicillin. It has been our experience that a dose of 100 units or over of penicillin per 1 cc. of lymph diluted 1 to 4 is usually certain to clear such a lymph of all contaminants, in other words 450 units of penicillin are required per gramme of lymph (0.99 cc. of glycerine = 1 gramme of pulp by weight).

This penicillin-treated lymph contained in sterile neutral glass bottles is next vigorously shaken for a minute to effect thorough and uniform mixing of the penicillin solution with the lymph. The shaking is best carried out by an electrical shaking machine. Twenty-four to forty-eight hours after treatment with penicillin the lymph is again put through the tests for purity and potency conforming to the Drug Rules and is finally clinically tested on unvaccinated children. This lymph should be used up within two months from the date of completion of purity and potency tests. If not used up, it should be retested for purity and potency before it is passed for issue.

The results of tests for purity of penicillinized lymph and of the potency of lymph before and after treatment with penicillin are set out in tables I and II respectively.

In this Institute, potency is tested on calf or rabbit whatever is available, according to the following methods.

(*A*) *On calf.*—Cunningham's test with a vesiculation factor above 2 in a dilution of 1 in 1,500.

The lymph is diluted 1 in 1,500 in physiological salt solution; the dilution is sown on a calf in series of five horizontal lines one above another and each one inch long, one dip of the knife in the lymph being used for each line. The result is read at 120 hours as under :—

(*a*) Continuous vesiculation along all the lines = 'Continuous'.

(*b*) Continuous vesiculation along a minimum of three lines and discreet vesicles on the remaining line = 'Almost continuous'.

(*c*) Discreet vesicles in all lines. Vesicles are counted and the number divided by the total length of the five incisions. This gives the vesiculation factor, *i.e.* the number of vesicles per inch. Example : if the number of vesicles counted is 10, then 10/5 = 2 which is the V.F. A lymph showing a vesiculation factor of less than 2 is discarded.

(*B*) *On rabbit.*—Stevenson's modification of Calmette-Guérin method (Stevenson and Butler, 1936); lymph is diluted 1 in 1,000 in physiological salt solution and 0.1 cc. of the diluted lymph is inoculated on the shaved back of a healthy, young, unvaccinated rabbit about six months old, on an area 7 cm. × 2 cm. Two rabbits are usually used for each test, since individual animals vary greatly in their relative susceptibility to the vaccine. But if there is time to wait, one rabbit is inoculated first and in case there is no reaction, a second rabbit is inoculated later.

An eruption of confluent vesiculation over the field of inoculation is usually produced in 5 days. Discreet vesicles are obtained in higher dilutions such as 1/5,000 or 1/10,000. Some very potent lymphs have given confluent reaction even in 1 in 10,000.

Penicillin used is crystalline penicillin G sodium manufactured by the following firms :

(1) Parke, Davis & Co., U.S.A.
(2) Glaxo Laboratory Ltd., England.
(3) E. R. Squibb & Sons, U.S.A.
(4) Commercial Solvent Corporation, U.S.A.
(5) Chas. Pfizer & Co., U.S.A.

Results and discussion

Results obtained with penicillin-treated glycerinated calf lymph vaccine have been quite satisfactory as will be evident from the results obtained from the vaccinators (*vide* table II). In this connection it is also emphasized that vaccination work in this province is not confined to the cold weather but is carried out throughout the hot season as well. Very high temperatures are recorded during the hot months of the year—April, May and June—when the maximum temperature varies from 108°F. to 116°F. Further it has been observed that vaccination with this penicillin purified glycerinated calf lymph, free from all extraneous organisms, is attended with marked absence of inflammation in the surrounding tissues and firm vesicles are obtained about the seventh day of vaccination. Table I shows that doses of penicillin varying from 50 to 102 units per cc. of lymph diluted 1 in 5 have been used. In some of the samples (serial nos. 14 to 18) where the initial counts of the untreated lymphs were already low (between 2,000 to 4,000 colonies per cc.), due to prolonged storage at 12°C., doses as low as 22 units per cc. were found sufficient to clear the lymphs of all growths, while in the case of the serial nos. 26 to 29, where the lymph numbers were treated with penicillin immediately after manufacture, 50 units of penicillin per cc. of lymph in each case were found adequate although the corresponding unpenicillinized samples showed innumerable colonies. It might be of interest to

Table I

Serial number	Lymph number	Quantity in cc.	Date of manufacture	Date of treating with penicillin	Dose of penicillin in units per cc.	Date of inoculation	Bacteriological tests				
							Results				
							After 24 hours	After 48 hours	After 5 days		
							N.B.	P.C.	G.B.	C.M.	L.M.
1	M 29	699	10-11-47	30-1-48	64	31-1-48	0	0	0	0	No change
2	M 30	598	10-11-47	30-1-48	64	31-1-48	0	0	0	0	Do.
3	M 31	581	10-11-47	30-1-48	64	31-1-48	0	0	0	0	Do.
4	M 33	606	10-11-47	30-1-48	64	31-1-48	0	0	0	0	Do.
5	M 34	502	10-11-47	13-2-48	80	31-1-48	0	0	0	0	Do.
6	M 35	702	25-11-47	20-2-48	80	31-1-48	0	0	0	0	Do.
7	M 39	662	8-12-47	20-2-48	80	21-2-48	0	0	0	0	Do.
8	M 53	965	22-12-47	12-3-48	77	16-3-48	0	0	0	0	Do.
9	M 54	719	22-12-47	12-3-48	77	16-3-48	0	0	0	0	Do.
10	M 55	773	22-12-47	12-3-48	77	16-3-48	0	0	0	0	Do.
11	M 56	892	23-12-47	12-3-48	77	16-3-48	0	0	0	0	Do.
12	M 57	565	23-12-47	12-3-48	77	16-3-48	0	0	0	0	Do.
13	M 59	716	29-12-47	31-3-48	76	2-4-48	0	0	0	0	Do.
14	M 78	982	27-1-48	4-9-48	22	8-9-48	0	0	0	0	Do.
15	M 79	995	2-2-48	4-9-48	22	8-9-48	0	0	0	0	Do.
16	M 80	916	2-2-48	4-9-48	22	8-9-48	0	0	0	0	Do.
17	M 81	655	2-2-48	4-9-48	22	8-9-48	0	0	0	0	Do.
18	M 82	1,000	3-2-48	4-9-48	22	8-9-48	0	0	0	0	Do.
19	M 83	831	3-2-48	11-9-48	64	14-9-48	0	0	0	0	Do.
20	M 94	930	9-2-48	11-9-48	64	14-9-48	0	0	0	0	Do.
21	M 1	936	23-8-48	9-11-48	102	19-11-48	0	0	0	0	Do.
22	M 2	904	23-8-48	17-11-48	102	19-11-48	0	0	0	0	Do.
23	M 3	988	23-8-48	17-11-48	102	19-11-48	0	0	0	0	Do.
24	M 4	819	23-8-48	17-11-48	102	19-11-48	0	0	0	0	Do.
25	M 17	880	20-9-48	14-12-48	89	21-12-48	0	0	0	0	Do.
26	M 78	204	3-2-49	3-2-49	50	6-2-49	0	0	0	0	Do.
27	M 79	492	7-2-49	7-2-49	50	10-2-49	0	0	0	0	Do.
28	M 85	424	21-2-49	21-2-49	50	24-2-49	0	0	0	0	Do.
29	M 86	486	21-2-49	21-2-49	50	24-2-49	0	0	0	0	Do.

N.B. = Nutrient broth.
P.C. = Agar plate count.
G.B. = Glucose broth.
C.M. = Robertson's cooked meat medium.
L.M. = Litmus milk.
0 = Sterile (no growth).

remember in this connection that penicillin is particularly active against young bacterial cells (Kolmer, 1947). The practice at the present moment, in this Institute, based on our experience, as has already been stated, is to use not less than 100 units of penicillin per cc. of lymph diluted 1 in 5.

Potency is the next question. Penicillin in the doses used did not affect the potency of the lymph in any case (*vide* table II). Further noticeable fact is that the potency of the penicillinized lymph did not deteriorate even eleven months after treatment with penicillin when such lymph samples were stored at —12°C.

Summary and conclusions

A method has been described for the rapid purification of glycerinated calf lymph vaccine by means of penicillin. Penicillin has been found to be a powerful agent in rapidly freeing the lymph—even freshly prepared lymph (table I, serial nos. 26 to 29) of the commonly found extraneous organisms without affecting the potency of the virus in the dosage used; thus a pure product can be in the hands of vaccinators within two weeks from the date of collection of lymph. The results of vaccination on children with penicillin-purified glycerinated calf lymph vaccine were found satisfactory (table II).

The author wishes to express his thanks to the Director of Public Health, Central Provinces and Berar, Lieut.-Colonel A. S. Garewal, for his keen interest and encouragement in the preparation of this paper. Opportunity is also taken to thank the staff of the C. P. Vaccine and Public Health Institute, particularly Messrs. B. G. Naidu and M. S. Dahikar, for their assistance in completing the records.

Table II

Serial number	Lymph number	Potency tests: Unpenicillinized lymph, On calf: Date of test	Dilution	Result at 96 hours	Penicillin-treated lymph, On calf: Date of test	Dilution	Result at 96 hours	Date of despatch to vaccinators	Total number of children vaccinated	Results received from vaccinators: Case success rate per cent	Insertion success rate per cent
1	M 29	30-1-48	1 in 1,500	Almost continuous.	9-2-48	1 in 1,500	Continuous	17-2-48	572	98	88
2	M 30	30-1-48	Do.	Do.	9-2-48	Do.	Do.	18-2-48	177	95	89
3	M 31	30-1-48	Do.	Do.	9-2-48	Do.	Do.	20-2-48	1,396	92	83
4	M 33	30-1-48	Do.	Do.	9-2-48	Do.	Do.	25-2-48	439	100	92
5	M 34	30-1-48	Do.	Do.	26-2-48	Do.	Do.	1-3-48	108	96	63
6	M 35	30-1-48	Do.	Do.	26-2-48	Do.	Do.	2-3-48	248	96	82
7	M 39	30-1-48	Do.	Do.	26-2-48	Do.	Do.	28-2-48	123	100	93
8	M 53	4-3-48	Do.	Continuous	17-3-48	Do.	Almost continuous.	1-4-48	2,194	97	87
9	M 54	4-3-48	Do.	Do.	17-3-48	Do.	Do.	6-4-48	1,259	99	92
10	M 55	4-3-48	Do.	Do.	17-3-48	Do.	Do.	12-4-48	1,418	98	93
11	M 56	4-3-48	Do.	Almost continuous.	17-3-48	Do.	Do.	16-4-48	1,412	98	86
12	M 57	4-3-48	Do.	Do.	17-3-48	Do.	Do.	22-4-48	866	97	92
13	M 59	24-3-48	Do.	Do.	17-3-48	Do.	Do.	26-4-48	1,863	98	90
14	M 78	2-9-48	Do.	Continuous	8-9-48	Do.	Continuous	28-9-48	1,135	99	93
15	M 79	2-9-48	Do.	Do.	8-9-48	Do.	Do.	29-9-48	845	98	88
16	M 80	2-9-48	Do.	Do.	8-9-48	Do.	Do.	1-10-48	618	98	91
17	M 81	2-9-48	Do.	Do.	8-9-48	Do.	Do.	4-10-48	1,164	95	90
18	M 82	2-9-48	Do.	Do.	8-9-48	Do.	Do.	6-10-48	2,333	98	90
19	M 83	2-9-48	Do.	Do.	15-9-48	Do.	Do.	11-10-48	933	95	91
20	M 84	9-9-48	Do.	Do.	15-9-48	Do.	Do.	11-10-48	1,337	98	92
21	M 1	25-8-48	Do.	Do.	9-11-48	Do.	Do.	30-11-48	2,885	93	90
22	M 2	25-8-48	Do.	Do.	9-11-48	Do.	Do.	1-12-48	2,308	97	88
23	M 3	25-8-48	Do.	Do.	9-11-48	Do.	Do.	3-12-48	1,420	93	89
24	M 4	25-8-48	Do.	Do.	9-11-48	Do.	Do.	4-12-48	1,635	93	93
25	M 17	29-9-48	1 in 5,000	Do.	16-12-48	1 in 5,000	Do.	21-9-49	911	99	89
					On rabbit						
26	M 44	Not done			3-3-48	1/1,000 1/10,000	Confluent discreet.	11-3-48	210	97	89
27	M 45	Do.			3-3-48	Do.	Do.	12-3-48	336	100	94
28	M 46	Do.			3-3-48	Do.	Do.	15-3-48	222	99	86
29	M 47	Do.			3-3-48	Do.	Do.	16-3-48	267	98	90
30	M 48	Do.			3-3-48	Do.	Do.	17-3-48	73	100	96
31	M 49	Do.			3-3-48	Do.	Do.	19-3-48	411	93	75
32	M 50	Do.			3-3-48	Do.	Do.	23-3-48	213	97	87
33	M 51	Do.			3-3-48	Do.	Do.	27-3-48	192	98	83

Table III

Serial number	Office copy of lymph number	Date of manufacture of lymph	Date of treatment with penicillin	Date of potency test after treated with penicillin	Date of despatch to vaccinators	Potency test on office copies of lymph numbers on calf: Date of test	Dilution	Result
1	M 53	22-12-47	12-3-48	17-3-48	1-4-48	9-2-49	1 in 1,500	Continuous.
2	M 54	22-12-47	12-3-48	17-3-48	6-4-48	9-2-49	Do.	Do.
3	M 55	22-12-47	12-3-48	17-3-48	12-4-48	9-2-49	Do.	Almost continuous.
4	M 56	23-12-47	12-3-48	17-3-48	16-4-48	9-2-49	Do.	Do.
5	M 57	23-12-47	12-3-48	17-3-48	22-4-48	16-2-49	Do.	Continuous.

TABLE IV

Result of purity tests on lymph samples penicillinized immediately after manufacture

Serial number	Lymph number	Date of manufacture	Quantity in cc.	Bacteriological tests												
				Before purification with penicillin					After purification with penicillin							
				Date of test	Results				Date of adding penicillin	Penicillin added in units per cc.	Date of test	Results				
					After 48 hours	After 5 days						After 24 hours	After 48 hours	After 5 days		
					P.C.	C.M.	G.B.	L.M.				N.B.	P.C.	C.M.	G.B.	L.M.
1	M 77	1-2-49	529	4-2-49	++++	G.T.	G.	0	1-2-49	50	4-2-49	0	0	0	0	No change
2	M 78	3-2-49	204	6-2-49	++++	Do.	Do.	0	3-2-49	50	6-2-49	0	0	0	0	Do.
3	M 79	7-2-49	492	10-2-49	++++	Do.	Do.	0	7-2-49	50	10-2-49	0	0	0	0	Do.
4	M 80	7-2-49	474	10-2-49	++++	Do.	Do.	0	7-2-49	50	10-2-49	0	0	0	0	Do.
5	M 81	7-2-49	204	10-2-49	++++	Do.	Do.	0	7-2-49	50	10-2-49	0	0	0	0	Do.
6	M 85	21-2-49	424	24-2-49	++++	Do.	Do.	0	21-2-49	50	24-2-49	0	0	0	0	Do.
7	M 86	21-2-49	486	24-2-49	++++	Do.	Do.	0	21-2-49	50	24-2-49	0	0	0	0	Do.
8	M 87	21-2-49	350	24-2-49	++++	Do.	Do.	0	21-2-49	50	24-2-49	0	0	0	0	Do.

P.C. = Agar plate count.
C.M. = Robertson's cooked meat medium.
G.B. = Glucose broth.
L.M. = Litmus milk.
N.B. = Nutrient broth.

++++ = Innumerable.
G.T. = Gas and turbidity.
G. = Gas.
0 = Sterile (no growth).

REFERENCES

COPEMAN, S. M. (1899). *Vaccination : Its Natural History and Pathology.* Macmillan Co., London.

KOLMER, J. A. (1947) .. *Penicillin Therapy.* D. Appleton-Century Co., New York.

LEVIN, B. S. (1935) .. *Compt. Rend. Acad. Sci.,* **200,** 1441.

PARKER, R. F., and RIVERS, T. M. (1936). *J. Exper. Med.,* **63,** 69.

SMITH, D. T., *et al.* (1948). *Zinsser's Textbook of Bacteriology.* D. Appleton-Century Co., New York.

STEVENSON, W. D. H., and BUTLER, G. G. (1936). *Report on Public Health and Medical Subjects,* No. 87. His Majesty's Stationery Office, London.

BIBLIOGRAPHY

DIAZ ROMERO, C. (1945). *Arch. Soc. Biol. Montevideo,* **12,** 152. (Abstract—*Bull. Hyg.,* 1946, **21,** 721.)

GAY, E. P., *et al.* (1935). *Agents of Disease and Host Resistance.* Baillière, Tindall and Cox, London.

MARSHALL, M. S., *et al.* (1947). *Applied Medical Bacteriology.* Lea and Febiger, Philadelphia.

PATEL, T. B. (1948) .. *Indian Med. Gaz.,* **83,** 452.

VAN ROOYEN, C. E., and RHODES, A. J. (1940). *Virus Diseases of Man.* Oxford University Press, London.

(*See* Correspondence, *I.M.G.*, August 1949, p. 379.—EDITOR, *I.M.G.*)

A Mirror of Hospital Practice

ANAPHYLACTIC SHOCK

By P. K. GHOSH, M.D.

Medical Officer, Seksaria Sugar Mills Ltd., P. O. Babhnan, District Gonda

THAT the development of anaphylactic shock is possible any time during a course of injections of substances liable to produce the reaction is clearly evidenced by the following case recently treated by me.

A Sikh lady, aged over 50, received two courses of milk injections for eczema. Before starting the second course, she was tested for anaphylactic reactions and was found negative to the test. She took 5 injections of lactoprotein (B.I.) twice a week without any trouble. About 15 minutes after the last injection of the course, of 10 cc., she suddenly developed severe anaphylactic shock. She was cold, clammy, almost unconscious with stiff body, fixed pupils insensitive to light or touch, almost imperceptible pulse and cadaveric face. Stimulant inhalations, draughts and 1 cc. 1 in 1,000 adrenalin (Evans') failing to show any improvement, coramine 1.7 cc. was given intravenously. This produced the desired effect and her subsequent recoupment was uneventful. She is in good health now.

A CASE OF RABIES

By M. HATANGDI, M.B., B.S., D.T.M.

Lady Jackson Hospital, Dohad

MRS. H. I., a Muslim female of 52 years, was bitten by a dog, said to be 'mad', on 2nd April, 1949, in the city of Dohad. She was bitten, unprovoked, on the left forearm and on the abdomen in the pubic and right inguinal regions. The bites on the forearm were on bare skin and those on the trunk were through clothing. There were twelve teeth marks, all drawing blood, some being superficial grazes and others being deep. All the bites were cauterized and later on dressed daily with 1 in 1,000 acriflavin solution. Class III treatment (10 cc. of anti-rabic vaccine by deep subcutaneous injection daily for 14 days) was instituted on the very first day, within about 4 hours of the bite, and duly completed on 15th April, 1949. Nothing untoward happened during the course and the bites too healed satisfactorily. Four days later on 19th April, 1949, she was again brought to the hospital as she was said to be behaving 'strangely' at home. She was said to have been getting into increasingly profound moods of depression during which she would be morose, talk to no one, sit in a corner all by herself for hours together, neither eat nor drink and at times cry softly; these moods alternated with ones in which she was very excitable, talking at random and would shriek all of a sudden as if with some mortal terror, and keep on saying that she was soon going to die and be with Allah. She would ask for food and drink but actually partake of very little saying that there was a devil in her throat who prevented her from swallowing. She complained of severe headache and slight fever. This had been going on for 3 days and she was treated with home remedies.

On examination, it was noted that she had excessive salivation, trembling of the lips and tongue with a slurring and stammering speech, tremors of the hands and a slight but definite exaggeration of the deep jerks on both sides. The pupils dilated and sluggish in reaction. She was restless and appeared to have some difficulty in breathing though there was no cyanosis or cardiac distress. There was no muscular rigidity but she complained of cramps in the thighs and legs. The bitten areas had completely healed and showed no signs of breaking down, nor were they tender or inflamed. She was given a glass of water to drink; the first two mouthfuls were taken slowly and with apparent difficulty. Then she put the glass down and would drink no more. The typical hydrophobic deglutitory spasm was absent. She had no fever but the pulse was fast, being 110 per minute. There were no clinical signs pointing to any other disease and she was diagnosed as a case of hydrophobia, possibly 'modified', as far as clinical features were concerned. She was given a bromide chloral