ON THE LOSS IN POTENCY OF DIPHTHERIA ANTITOXIN WHEN KEPT AT 36° C.

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(With 3 Charts.)

Numerous papers have been published on the effect of heat on diphtheria antitoxin, but there appears to be no record of a series of observations carried out at a temperature nearly that of the human body. The object of this note is to fill in this slight gap in our knowledge.

A number of ordinary serum bottles were filled with serum and sealed off in the flame. Some were placed in the hot room at a temperature of 36° C., some were put in the ice chest and some in a cellar where the temperature varied between 6° C. and 16° C. From time to time a bottle was opened and the antitoxin-content estimated to within 10 units.

Three sera were treated in this way. In one case four bulk samples were also put up—100 c.cm. of serum in a 250 c.cm. flask plugged with a rubber cork. The serum in one of these flasks was covered with a layer of liquid paraffin. This flask and one of the other three were placed at 36° C., another was kept in the cellar, while the third was put in the ice chest.

The dates of the bleedings of the various horses and the results of the tests are given in the accompanying charts.

For convenience of comparison some values may be extracted from the charts.

Taking the sera kept in the ice chest and in the cellar, we find that the losses were approximately as follows:

	6 months		1 year	
	Ice chest	Cellar	Ice chest	Cellar
D 56 (mixture of 8 bleedings)	7 %	5 %	7 %	14 %
D 59 (mixture of 6 bleedings)	2 ,,	1 ,,	4 ,,	9 ,,
D 74 (single bleeding)	2 ,,	4 ,,		

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These values agree quite well with those obtained by Anderson (1910) from an examination of 18 sera kept at 5° C. and 15° C. He found that the yearly loss of antitoxin was about 6 % at 5° C. and about 10 % at 15° C.

He also kept sera at "room-temperature" (this varied between 70° F. in winter and 95°–100° F. in summer) and found the yearly loss to be about 20 %.

Though his "room-temperature" was at some time above 36° C., it could not have been so for long judging by the results of keeping serum continuously at 36° C.

Loss in unitage of serum kept at 36° C.

	3 weeks	4 weeks	9 weeks	6 months	1 year
D 56	Nil	5 %	20 %	37 %	46 %
D 59	9 %	—	26 ,,	37 ,,	51 ,,
D 74 in bottle	14 ,,	—	22 ,,	35 ,,	—
D 74 in bulk	—	—	—	58 ,,	—
D 74 in bulk under paraffin	—	—	—	62 ,,	—

Anderson's (p. 25) maximum loss in three years at 15° C. was 36 % and at "room-temperature" 59 % whereas from my results there is at 36° C. a loss of about 36 % in six months and of about 49 % in one year. And there is an even more rapid decrease in value in serum kept *in bulk* at 36° C. as the loss in six months reached 60 %, which exceeds Anderson's *maximum* for three years at "room-temperature." A layer of paraffin over the surface of serum kept in bulk has no effect in diminishing the loss.

It is curious that two sera at first lost more in the ice chest than in the cellar.

In conclusion it may be said that when serum is kept in small bottles deterioration appears to take place on an average about six times as fast at 36° C. as in an ice chest.

REFERENCE.

ANDERSON, JOHN F. (1910). The influence of age and temperature on the potency of diphtheria antitoxin. *Bull. No.* 66, *Hyg. Lab. U.S. Pub. Health and Mar.—Hosp. Serv.* Wash. pp. 9–26.

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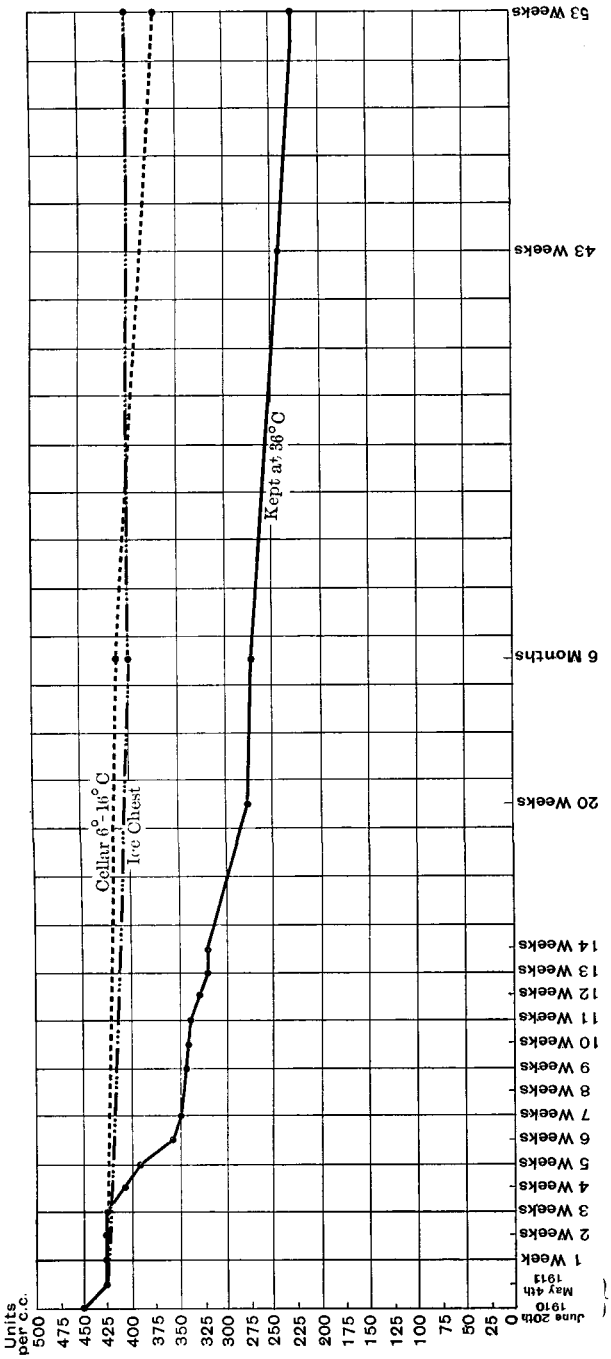

Chart 1. D 56. Bleedings—Common 13. I. 10; Huntress 17. I. 10; Cabby 31. I. 10; Brack 14. II. 10; Winchester 13. I. 10; Brougham 31. III. 10; Negress 13. I. 10; Negress 18. III. 10.

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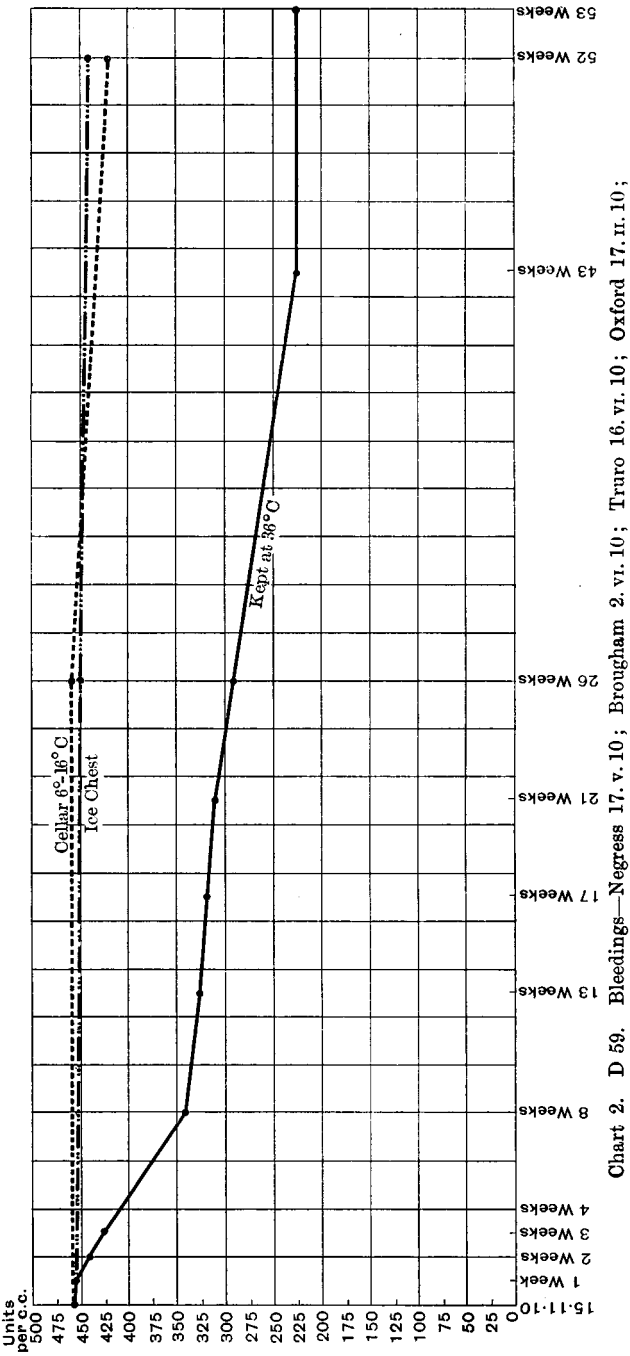

Chart 2. D 59. Bleedings—Negress 17. v. 10; Brougham 2. vi. 10; Truro 16. vi. 10; Oxford 17. ii. 10; Douglas 8. ix. 10; Oxford 16. vi. 10.

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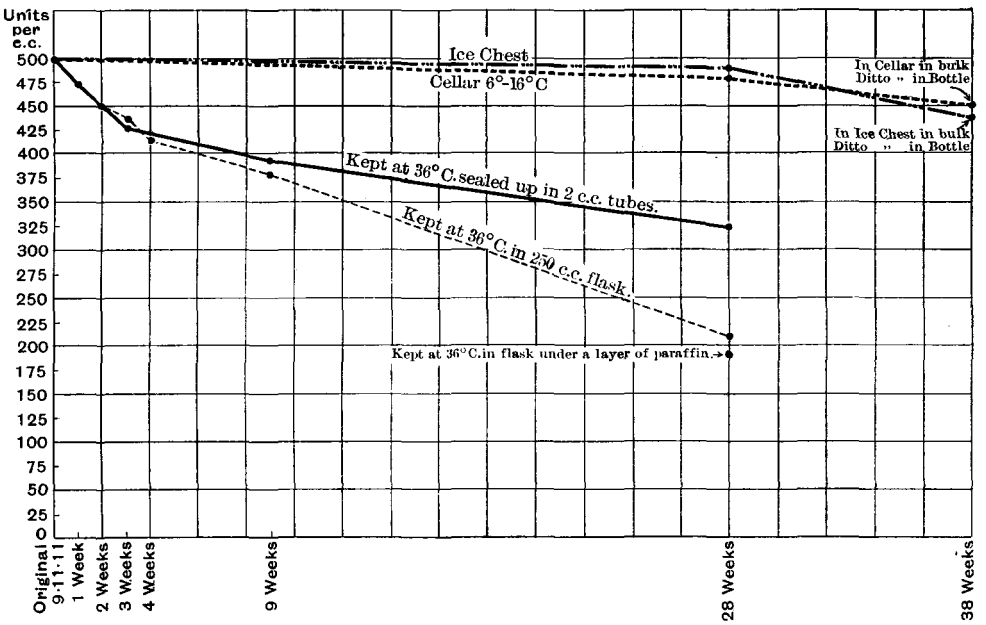

Chart 3. D 74. Oxhey, bleeding 22. II. 11.

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