THE RELATIONSHIP OF THE RED, WHITE, AND DIFFERENTIAL BLOOD CELL COUNTS AND HEMOGLOBIN ESTIMATIONS IN DOGS WITH CLOSED JEJUNAL LOOPS TO THE CLINICAL CONDITION OF THE ANIMAL AND THE PRESSURE AND VOLUME OF THE LOOP CONTENT.

by

George R. Suckow, A. B.

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The Relationship of the Red, White, and Differential Blood Cell Counts and Hemoglobin Estimations in Dogs with Closed Jejunal Loops to the Clinical Condition of the Animal and to the Pressure and Volume of the Loop Content.

Introduction.

a. Purpose of the problem:

The study involved in this problem was undertaken in an attempt to find the relationship between the blood picture stated in the title to, (1) the clinical condition of the animal, viz., general health, appetite, presence or absence of vomiting, temperature, dehydration, operative recovery, operative course, length of post-operative life, etc., (2) pressure and volume of the loop content, (3) experimental and surgical acute and chronic intestinal obstruction.

b. Previous work on the subject:

A survey of the literature has revealed no work directly applicable to this problem. A great deal of work has been done on experimental intestinal obstruction in dogs as well as on closed jejunal loops in dogs, but apparently little or nothing on the particular phase involved in this problem.

Methods employed:

a. Preparation and use of the animals:

1. Use of non-operated controls:

Three non-operated control dogs were employed. Care was taken to see that they were in perfect health and that they had not been subjected to experimental or surgical use prior to their being employed in this work. The following table shows the extent of their use:

1. Male #1.

Complete weekly blood counts done for 4 successive weeks.

Complete blood counts done daily for 19 successive days.

2. Female #1. (pregnant).

Complete weekly blood counts done for 4 successive weeks.

Complete daily blood counts done for 5 successive days.

3. Female #2. (not pregnant).

Complete daily blood counts for 21 successive days.

2. Use of animals for operation:

Dogs were selected which were in perfect health and which had had no previous experimental or surgical work performed on them. Counts and estimations were made on a series of 47 animals, varying in weight from 7 to 24 kilos and including both sexes. One or more pre-operative and varying numbers of post-operative counts were done on each of the dogs employed.

(a) Pre-operative preparation:

The animal was carefully selected and examined to see that it was in perfect health and that it had not been used for previous experimental or surgical work. Its number, description, weight, sex, pre-operative count, and date of operation were recorded in the protocol. Food was with-held from it on the day previous to the operation and on the day of operation. Water was permitted ad. lib. up to the time of operation. Thirty minutes before the operation the animal was given hypodermically 1/4 grain of morphine sulphate and 1/120 grain of atropine sul-

phate.

(b) Operative methods employed:

In performing all operative work a strict aseptic regime was maintained as far as possible. Immediately preceding the operation the animal's abdomen was carefully shaved, cleansed with soap, water, and ether, and painted with Tr. Iodine. Sterile drapes were next applied, permitting exposure of only the field of laparotomy. A right rectus incision averaging about 12 cm. in length, parallel to, and about 3 cm. from the linea alba, was employed. The jejunum was picked up and a portion 10 cm. from the duodeno-jejunel junction was isolated and a loop of gut made here by clamping, sectioning, and turning the ends with inverting sutures. In dogs 1 to 12 inc., the loop measured 4 finger breadths in length; in dogs 13 to 23 inc. the loop measured 6 finger breadths in length; and in dogs 24 to 46 inc. the loop measured 8 finger breadths in length. No irrigation of the loop was made, with the exception of 2 instances where irrigation was felt necessary (gut contained worms), and records of these exceptions were made in the protocols. Care was taken in selecting the segment of the gut to be made into a loop that the mesenteric blood supply to the loop would be ample and not hindered in any way. The ends of the loop were turned in with plain 00 catgut by the Parker-Kerr technique. The free ends of the proximal and distal segments of the intestine had their clamps placed obliqely so as to enlarge the anastomotic lumen, and also to insure the circulation to the anti-mesenteric border. The cut ends were cauterized with a hot iron before being re-united for the anastomosis. The cut ends were brought together and sutured with interrupted Halsted and L embert sutures, using fine black silk and straight milliner's needles as suture material. The sutured were all placed and were tied after the clamps were

removed. The anastomosis was surrounded by omentum, which was held in place by a few interuupted Lembert sutures. In dogs 1-5 inc., the loop was sutured to the peritoneal incision with a continuous suture of 00 catgut. In dog 6 et. seq., the loop was sutured to the peritioneum of the anterior abdominal wall in the midline with interrupted sutures of fine black silk. The incision was then closed. Several sutures were made in the intact skin overlying the loop as landmarks for future puncturing of the loop for the relief and estimation of intra-loop pressure. The fascial-muscular layer was sewed with plain no. 2 catgut, and the skin with linen.. Care was taken to prevent infection of the site of laparotomy during the operative procedure in order to prevent alteration of the subsequent blood picture and to insure a speedier and more satisfactory post-operative course.

(c) Postoperative care:

The animals received water beginning on the third day and food beginning on the fifth day after the operation. The linen sutures were removed on the 4th day after the operation. Special care was taken of the laparotomy against post-operative infection and stitch abcesses and infections were promptly treated when found. Blood counts and estimations were made daily for a week and then about twice weekly as the data explained later will show. Relief and measurement of intra-loop pressure was also immediately instituted as is explained below. Daily 8 A.M. and 4 P.M. temperatures (rectal) readings were taken throughout the course of the animal.

(b) Records obtained:

A complete record of each animal was maintained: A description of the animal, his number, all pre- and post-operative routine performed, daily 8 A.M. and 4 P.M. temperatures, loop

content pressures and volumes, blood pictures, post-mortem records, etc. Also the animal's daily condition, appetite, presence or absence of vomiting, condition of the alimentary tract, losses or gains in weight, sudden prostration, infection of any sort developing in the wound, therapeutic measures applied, etc.

(c) Technique employed:

1. Blood counts and estimations:

Blood for counts and estimations was obtained from the ear of the animal after shaving, cleaning, and sterilizing, by pricking the point of the ear with the point of a sharp scalpel. Pre-operative counts were made about one hour prior to the administration of the pre-operative dose of morphine. An Adams improved Neubauer ruling counting chamber was employed for counting the red cells and white cells, and the hemoglobin was estimated by the use of the Sahli hemometer, using the Haskins improved standard. One hundred and ninety complete counts on the 46 operated dogs, and 25 complete counts on the control dogs, in all, were made. Counts were made at varying intervals following the operation, but in general the plan was: normal pre-operative count; a count daily on each dog for a week following the operation, followed by bi-weekly counts; or whenever the clinical condition of the animal demanded a count. By the term count is inferred: (1) Total red cells. (2) Total white cells. (3) Differential white cell count. (4) Hemoglobin estimation. All four of these were done each time; they were never estimated singly, or less than four at a time.

2. Loop content volume and pressure technique:

As far as possible the loop content pressure and volume were measured on the first, second, and fourth post-operative days routinely. After the fourth day the loop pressure and volume

were measured and relieved when the clinical condition of the animal seemed to necessitate such a procedure. Loss of appetite, rise in temperature, weakness, and vomiting were the main signs which were found to indicate a distended loop. After the 4th post-operative day the loops were not tapped unless necessary. The tapping was done by means of a long sterile hypodermic needle inserted thru the abdominal wall directly over the loop. Pressure was measured by means of a water manometer tube connected with a hypodermic needle inserted into the loop. The volume of the loop contents was measured by collecting the aspitated contents from the syringe in a graduate. Care was taken not to contaminate the loop contents during the tapping, and to aid in insuring this the field of skin overlying the loop and around the site of puncture was washed with 70% alcohol and painted with dilute Tr. Iodine.

3. Post Mortems:

Careful post mortems were made on all the experimental animals used in the event of their death. The cause of the death was ascertained as far as possible and compared to the clinical records of the animal's course. Careful post-mortem records were kept.

d. Classification of the experimental animals used:

It was found during the course of this investigation that the operated animals used could be divided into the following groups:

1. Operated animals with normal recovery:

Normal recovery signified that by means of tapping and successful surgical technique the animal lived following the operation for a period longer than 7 days, with a convalescence and post-operative course free from wound infection or intermediate attacks of peritonitis. That is, in this type of animal the

loop pressure which was necessary to distend and rupture the loop.

2. Operated animals with infection complicating the post-operative course.

By infection is signified stitch abcesses, subcutaneous infection, etc., in the vicinity of the laparotomy incision.

3. Operated animals with course terminating in peritonitis:

a. Early peritonitis:

By early peritonitis is meant peritonitis causing death within one week (7 days) following the operation.

b. Late peritonitis:

By late peritonitis is meant peritonitis causing death at any time after the 7th day following the operation.

Results:

See the following tables and graphs with interpretations and explanations.

Table 1.

In normal dogs:

1. Day to day count:

Using male control #1:

Day	Reds	Whites	Hemo	Polys	Small Lymph.
5th	6.00	10,600	100	78	22
6th	5.96	10,650	100	78	22
7th	6.01	10,500	102	76	24
av.	5.98	10,550	101	77	23

2. Weekly count:

Using male control #1: (these counts made 4 months later than those above)

Week	Reds	Whites	Hemo	Polys	Small lymph.
1st	7.94	7700	108	68	30
2nd	6.75	6000	110	55	44
3rd	7.25	8200	114	54	40
4th	8.09	7500	120	76	22
Av.	7.51	7350	113	63	34

Using Female control #1: (possibly pregnant)

Week	Reds	Whites	Hemo	Polys	Small lymph.
1st	7.36	9150	110	68	28
2nd	8.10	8500	127	69	29
3rd	7.51	10700	115	62	33
4th	8.32	17000	135	67	29
Av.	7.82	11837	122	66	29

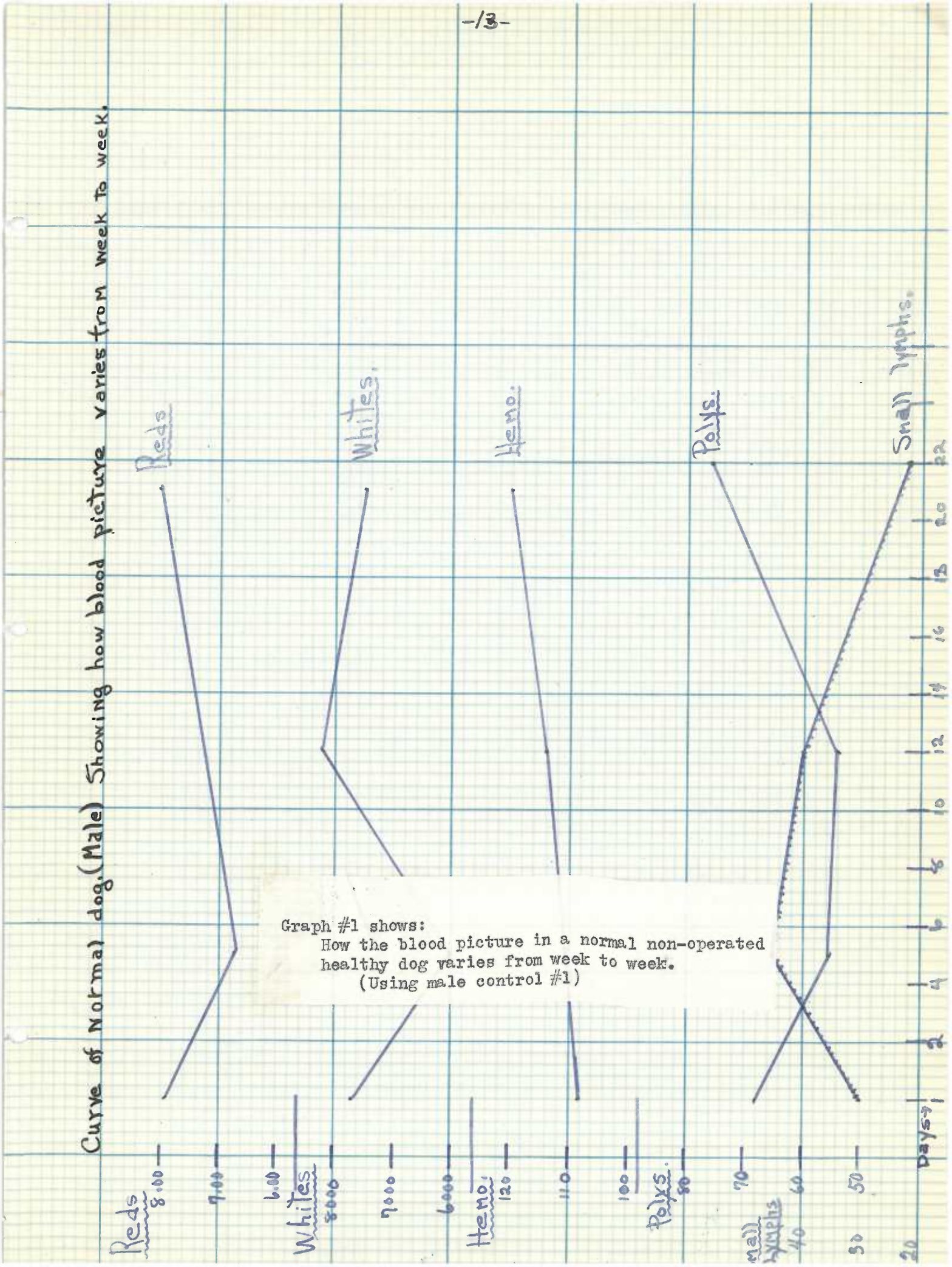
Table 1 and graph 1 show that the daily and weekly blood picture is quite constant in normal non-operated dogs.

Counts in Normal Dogs. Taken at approximately weekly intervals. Table 2.

Dog	Day	reds	whites	hemo	polys.	small lymph.	others.
Male	1.	7.94	7780	108	60	30	2
	5.	6.75	6000	110	55	44	1
	12.	7.25	8200	114	54	40	5
	21.	8.09	7500	120	76	22	2
	Average	7.51	7550	113	63	34	3
Female	1.	756	9150	110	68	28	4
	5.	6.10	8500	127	69	29	2
	12.	7.51	10700	115	62	33	5
	21.	8.32	17000	135	67	29	4
	Average.	7.62	11,857	122	66	29	4

Normal preoperative counts on dogs used in operations. Taken just prior to operation.

Dog	Day	Reds	Whites	Hemo	Polys.	Small Lymph.	Others.
6.		7.20	9500	102.			
7.		6.61	9500	84.			
8.		8.50	13000	100.			
9.		7.02	11650	100			
10.		5.67	16400	98			
11.		7.25	14000	110	88	8	4
12.		5.90	201002	78	78	21	1
13.		6.15	14700	108	68	32	
14.		5.61	22900	110	65	35	
15.		7.10	10200	115	71	28	1
16		7.10	10600	110	69	26	5
17.		6.33	15,500	112	80	16	4
18.							
19.		7.25	8800	95	58	35	7
20.		6.83	7500	118	60	35	5.
21.		6.84	8950	110	62	24	14.
22.		6.57	6250	100	84	16	
23		6.42	17500	112	79	20	1
24.		7.90	12050	110	64	30	6
25.		7.47	6250	108	75	20	5
26.		9.55	8200	108	74	20	6
27.		7.64	8850	106	63	21	16
28.		6.18	16200	104	72	18	10
29		7.71	10000	112	76	19	4.
30		9.11	9450	115	80	19	1.
31.		7.41	7500	120	70	15	15.
32.		6.08	11400	100	69	30	1.
33.		9.33	7850	150	76	12.	12.
34.		7.62	13500	112	74	24	2
35		7.58	15900	115	92	4	4
36		7.54	9200x	113	70	26	4
37		7.98	10950	120	81	14	5
38		7.18	10050	115	90	10	
39		6.20	8850	115	80	16	4
40		6.82	15500	100	86	14	
41							
42							
43		7.27	13650	110	92	6	
44		6.65	10050	98	74	26	
45		7.80	7550	130	92	8	
46		7.00	23,250 (checked 2x)	120	82	11	7
Average:		7.01	11, 792	109	75	19	6



Graph #1 shows:
How the blood picture in a normal non-operated healthy dog varies from week to week.
(Using male control #1)

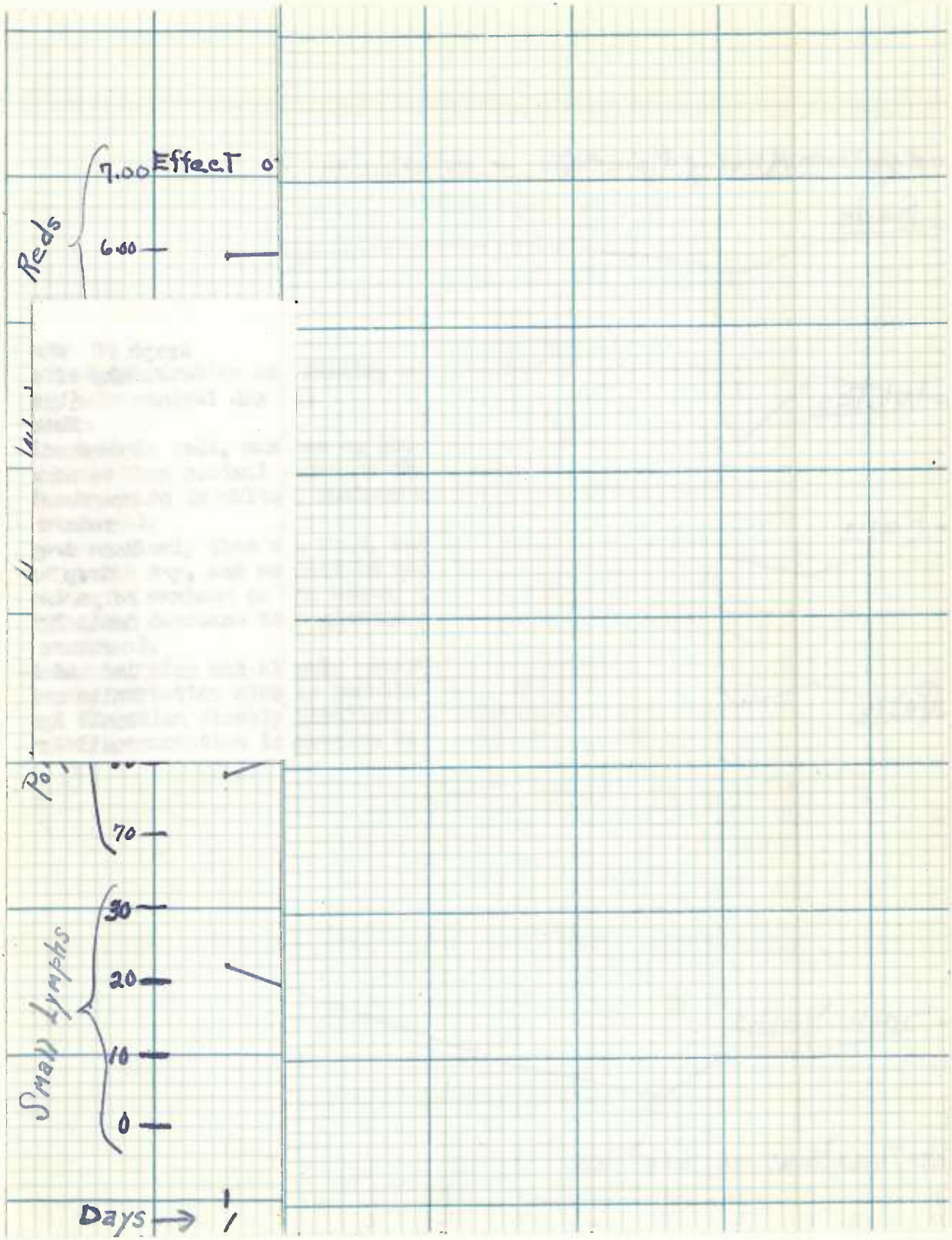

Effect
7.00
6.00
Reds
70
30
20
10
0
Small Lymphs
Days

Table 3.

Blood findings in operated dog with normal recovery.(32)

Day following operation:	0	8	16	36	50	57
Reds	6.06	6.77	7.38	7.33	6.96	6.10
Whites	11-	40-	24-	10-	15-	14-
Hemo	100	88	108	120	140	114
Polys	69	88	89	78	78	89
Small lymph.	30	8	9	22	22	11
Others	1	4	3	0	0	0

This plate shows:

During two months of postoperative life:

Gradual increase in reds from 6.06 to 6.10

Whites have varied from 11,000 to 40,000

Were maximum on the 8th day

Gradually fell from 40,000 on the 8th day to 14,000 on the 57th day.

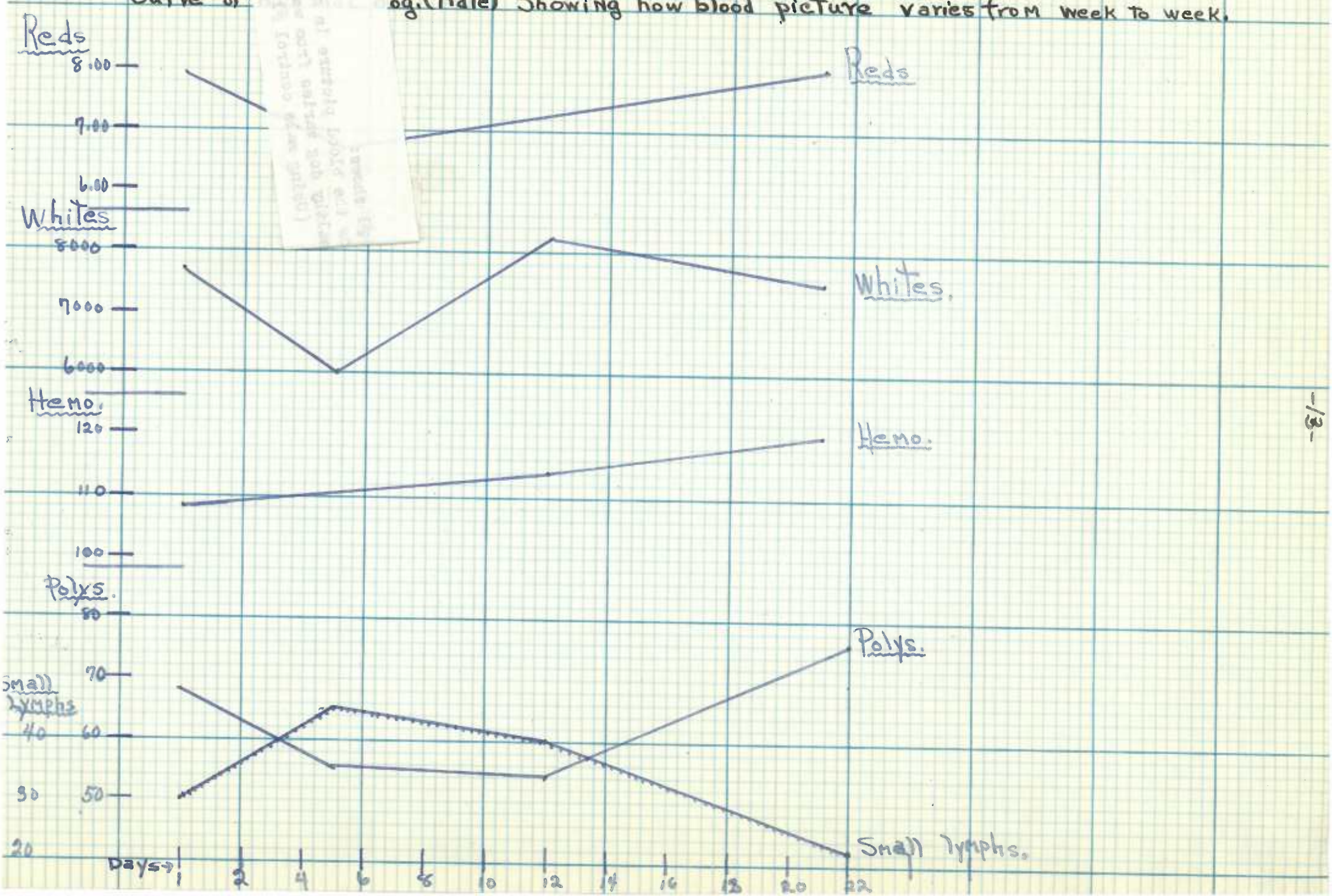
Hemo has gradually increased from 100-114

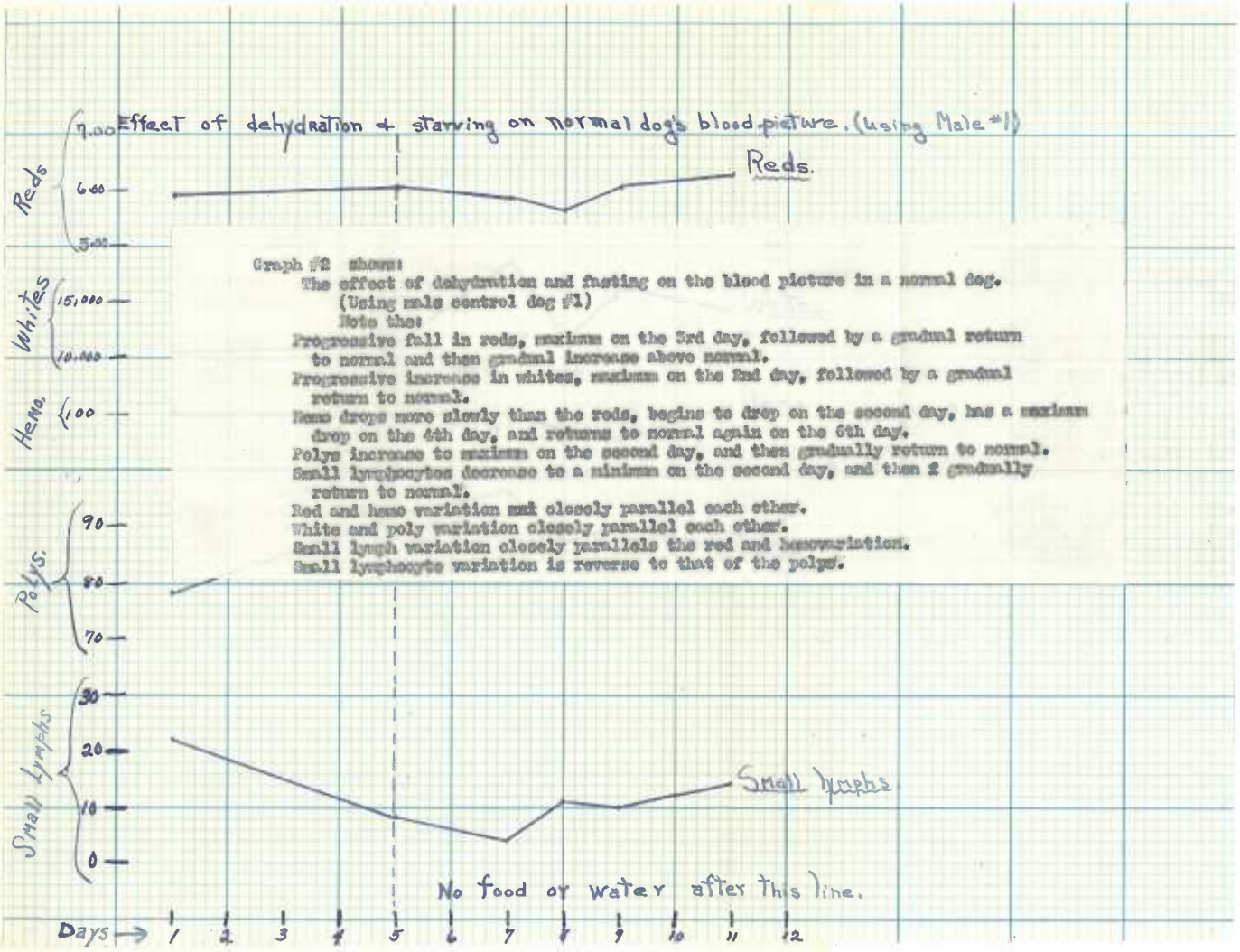
Polys & have gradually increased from 69 to 89

Small lymphocytes have fallen from 30 to 11.

Reds and hemo variation parallel each other, and also parallel the total white and poly counts

Curve of [illegible] og. (Male) Showing how blood picture varies from week to week.





Graph #2 shows:

The effect of dehydration and fasting on the blood picture in a normal dog.
(Using male control dog #1)

Note that:

Progressive fall in reds, maximum on the 3rd day, followed by a gradual return to normal and then gradual increase above normal.

Progressive increase in whites, maximum on the 2nd day, followed by a gradual return to normal.

Hemo drops more slowly than the reds, begins to drop on the second day, has a maximum drop on the 4th day, and returns to normal again on the 6th day.

Polys increase to maximum on the second day, and then gradually return to normal.

Small lymphocytes decrease to a minimum on the second day, and then & gradually return to normal.

Red and hemo variation mst closely parallel each other.

White and poly variation closely parallel each other.

Small lymph variation closely parallels the red and hemovariation.

Small lymphocyte variation is reverse to that of the polys.

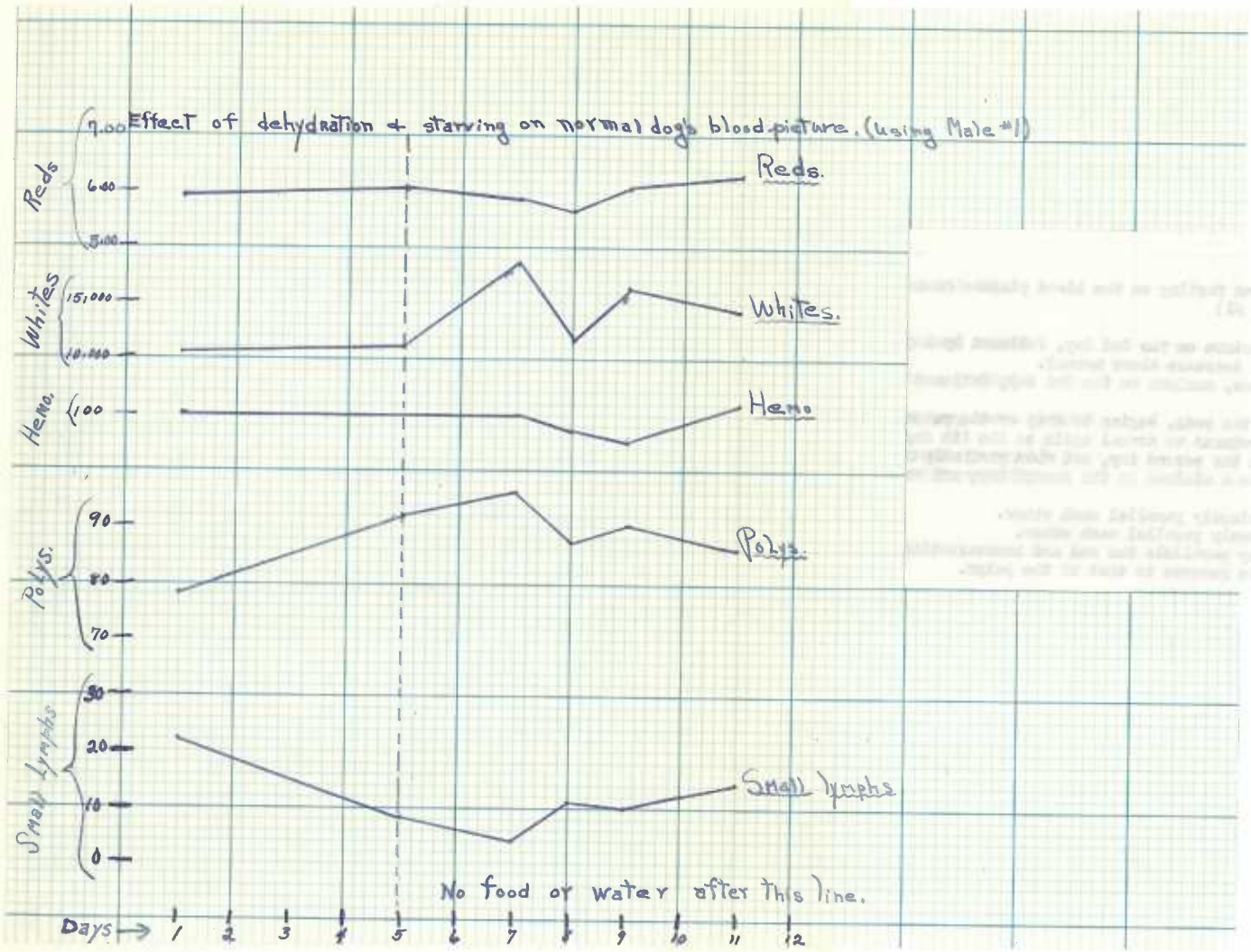

Effect of dehydration + starving on normal dog's blood picture. (using Male #1)
Reds
7,000
6,400
5,000
Reds.
Whites
15,000
10,000
Whites.
Hemo.
100
Hemo
Polys.
90
80
70
Polys.
Small Lymphs
30
20
10
0
Small Lymphs
No food or water after this line.
Days →
1
2
3
4
5
6
7
8
9
10
11
12

Table 3.

Blood findings in operated dog with normal recovery.(32)

Day following operation:	0	8	16	36	50	57
Reds	6.06	6.77	7.38	7.33	6.96	8.10
Whites	11-	40-	24-	10-	15-	14-
Hemo	100	88	108	120	140	114
Polys	69	88	89	78	78	89
Small lymph.	30	8	9	22	22	11
Others	1	4	3	0	0	0

This plate shows:

During two months of postoperative life:

Gradual increase in reds from 6.06 to 8.10

Whites have varied from 11,000 to 40,000

Were maximum on the 8th day

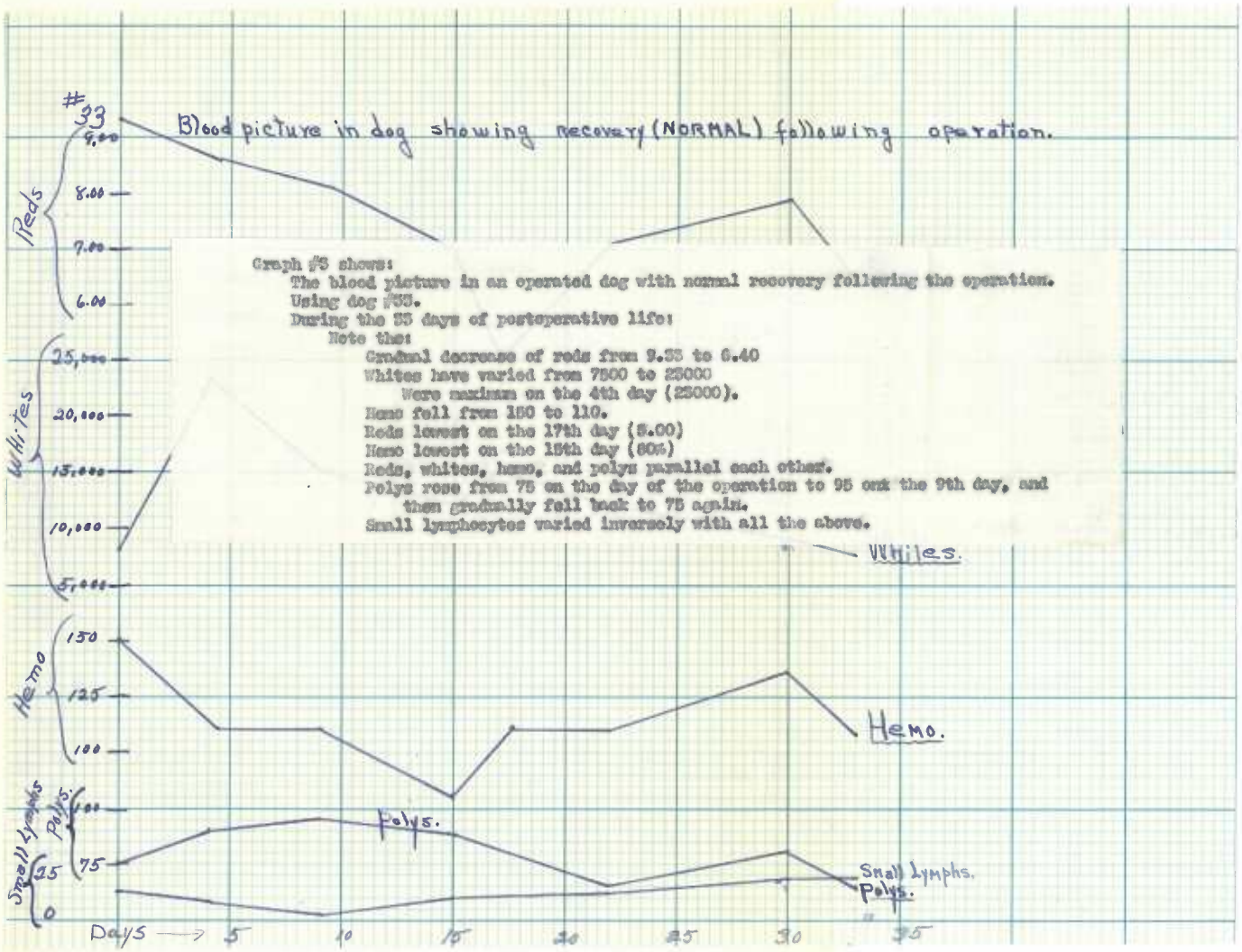
Gradually fell from 40,000 on the 8th day to 14,000 on the 57th day.

Hemo has gradually increased from 100-114

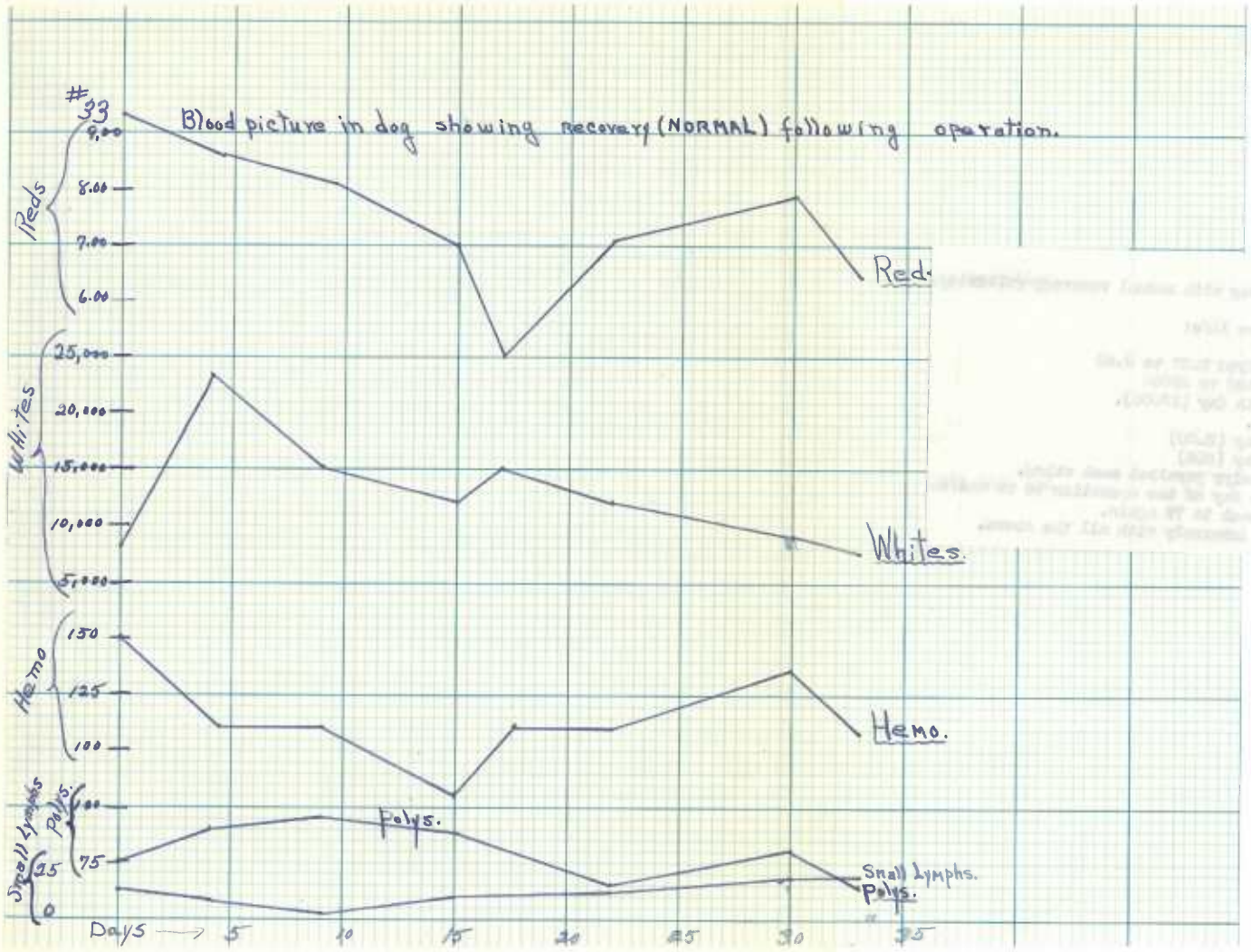
Polys have gradually increased from 69 to 89

Small lymphocytes have fallen from 30 to 11.

Reds and hemo variation parallel each other, and also parallel the total white and poly counts



Graph #3 shows:
The blood picture in an operated dog with normal recovery following the operation.
Using dog #33.
During the 35 days of postoperative life:
Note the:
Gradual decrease of reds from 9.35 to 6.40
Whites have varied from 7500 to 25000
Were maximum on the 4th day (25000).
Hemo fell from 150 to 110.
Reds lowest on the 17th day (6.00)
Hemo lowest on the 15th day (60%)
Reds, whites, hemo, and polys parallel each other.
Polys rose from 75 on the day of the operation to 95 onx the 9th day, and
then gradually fell back to 75 again.
Small lymphocytes varied inversely with all the above.


#33
Blood picture in dog showing recovery (NORMAL) following operation.
Reds
9,00
8.00
7.00
6.00
Reds
Whites
25,000
20,000
15,000
10,000
5,000
Whites.
Hemo
150
125
100
Hemo.
Small Lymphs
Polys.
100
75
25
0
Polys.
Small Lymphs.
Polys.
Days →
5
10
15
20
25
30
35

Dog #33.

Curve of Dog. Course Complicated by Infection.

Graph #4 shows:
The blood picture in an operated dog with infection complicating the postoperative course.
Using dog #33.
Note that the:

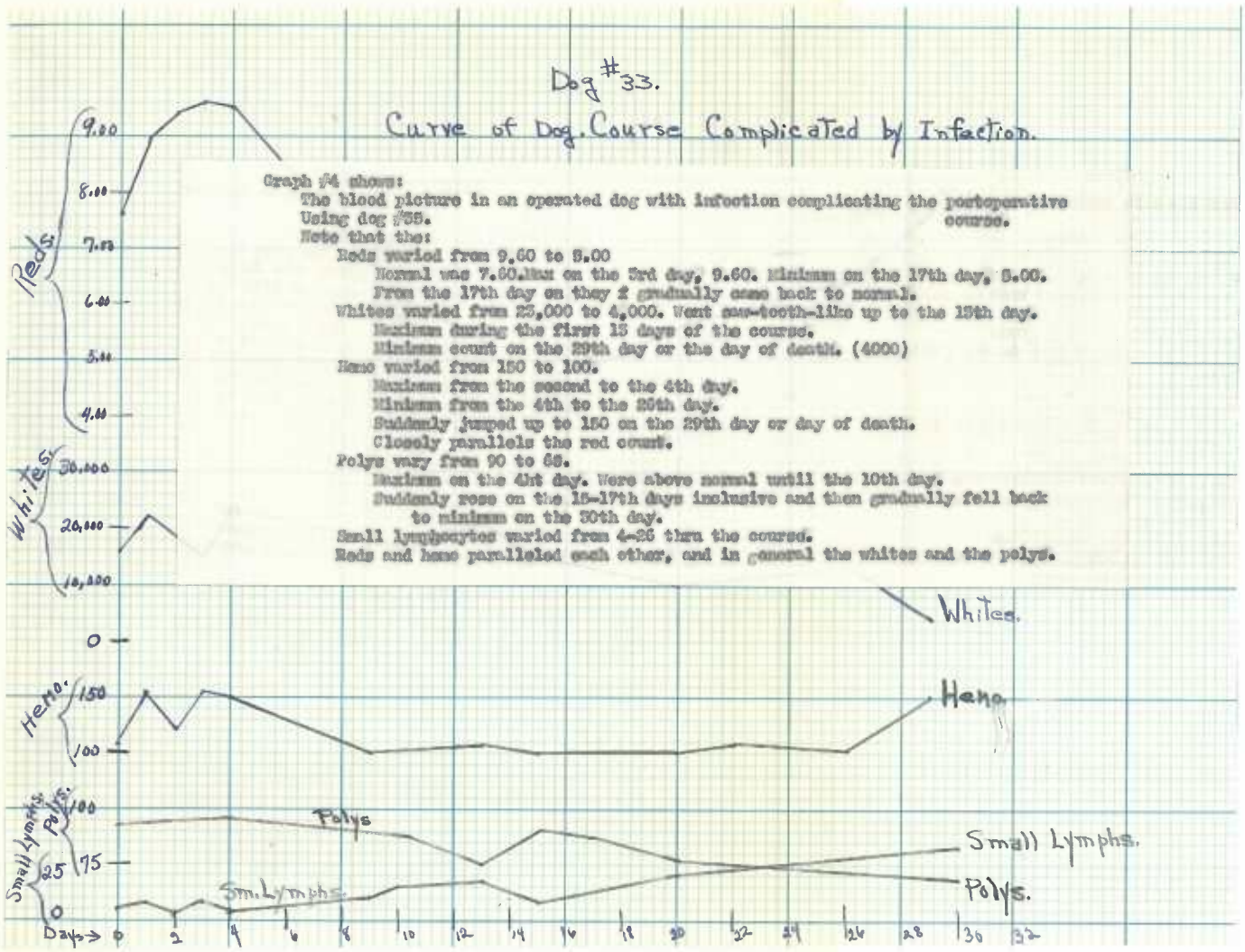
Reds varied from 9.60 to 5.00
Normal was 7.60. But on the 3rd day, 9.60. Minimum on the 17th day, 5.00.
From the 17th day on they gradually came back to normal.

Whites varied from 23,000 to 4,000. Went saw-tooth-like up to the 19th day.
Maximum during the first 15 days of the course.
Minimum count on the 29th day or the day of death. (4000)

Hemo varied from 150 to 100.
Maximum from the second to the 4th day.
Minimum from the 4th to the 20th day.
Suddenly jumped up to 150 on the 29th day or day of death.
Closely parallels the red count.

Polys vary from 90 to 65.
Maximum on the 4ht day. Were above normal until the 10th day.
Suddenly rose on the 15-17th days inclusive and then gradually fell back to minimum on the 30th day.

Small lymphocytes varied from 4-25 thru the course.
Reds and hemo paralleled each other, and in general the whites and the polys.



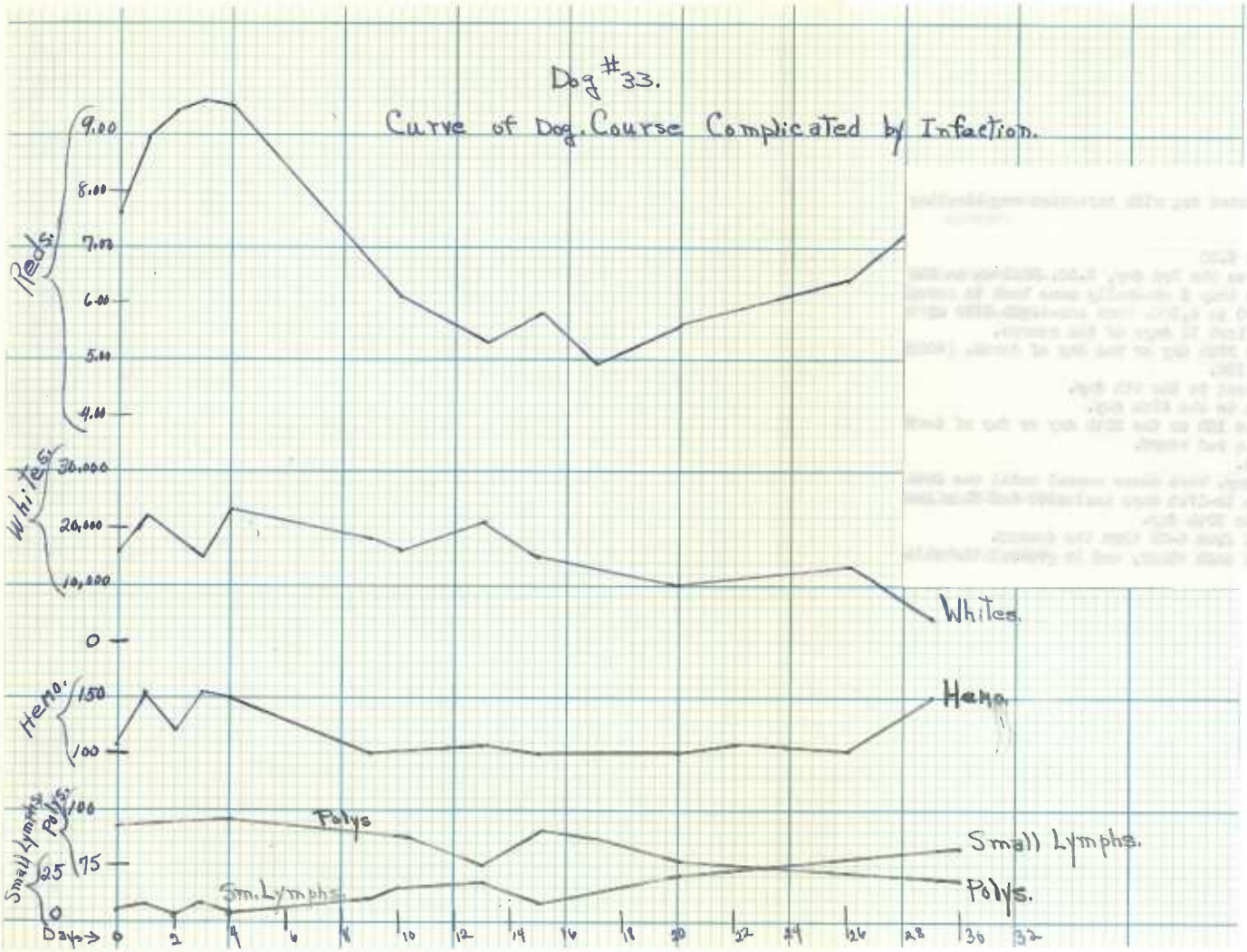

Dog #33.
Curve of Dog. Course Complicated by Infection.
Reds.
9.00
8.00
7.00
6.00
5.00
4.00
Whites.
30,000
20,000
10,000
0
Whites.
Hemo.
150
100
Hemo.
Small Lymphs.
Polys.
100
75
25
0
Polys
Sm. Lymphs.
Small Lymphs.
Polys.
Days →
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32

Table ~~(continued with Group #7)~~

Blood picture in eviscerated dogs dying of peritonitis closely following the operation.

Dog #37.	Reds	Whites.	Hemo	Polys	Small lymph.	Others.
D of Op.	7.98	10,950	120	81	14	5
1st day	8.39	26,000	119	96	1	3
2nd day	7.44	26,550	125	96	4	
3rd day	8.44	31,850	145	96	3	1

Dog #38	Reds	Whites	Hemo	Polys	Small lymph.	Others.
D of Op.	7.16	10,050	115	90	10	
1st day	8.54	31,600	122	94	4	2
2nd day	6.73	25,500	110	82	11	7
3rd day						
4th day	5.61	15,000	117	84	12	4

Dog #39	Reds	Whites	Hemo	Polys	Small lymph	Others.
Day of op	6.20	6850	115	80	16	4
1stday	6.93	16,800	115	90	7	3
2nd day	6.82	16,500	143	78	16	6
3rd day						

Dog #40	Reds	Whites	Hemo	Polys	Small lymph	Others.
D of Op	6.52	15,500	100	86	14	
1st day	6.01	27,350	100	97	3	
2nd day						
3rd day	5.91	20,600	105	82	12	6

Dog #45	Reds	Whites	Hemo	Polys	Small lymph	Others.
D of Op	7.80	7550	130	92	8	
1st day	9.20	29,700	145	91	9	
2nd day	9.76	31,750	165	90	10	
3rd day						
4th day.	10.44	32,750	170	99	1	

Interpretation of this data:

Dog 37: Reds approximately no change thru the course.
Whites: second day 26,000, third day 31,000
Hemo rose to 145 on the 3rd day.
Polys increased to 96 on the day of death.
Small lymphocytes fell from 14 to 3.

Dog 38: Reds approximately no change
Whites maximum on the second day (31,000)
Hemo approximately no change.
Polys dropped, 90 to 84.
Small lymphocytes showed no change.

Dog 40: Reds approximately no change. Whites maximum on the first day.
Hemo no change.
Polys highest and small lymphocytes lowest on the first day.

Dog 45: Reds gradually increased to a maximum (10million) on the 4th or fatal day.
Whites maximum on the 4th ~~day~~ day.
Hemo gradually increased to a maximum on the 4th day (170%)
Polys maximum on the 4th day (99%).
Small lymphocytes only 1% on the 4th day.

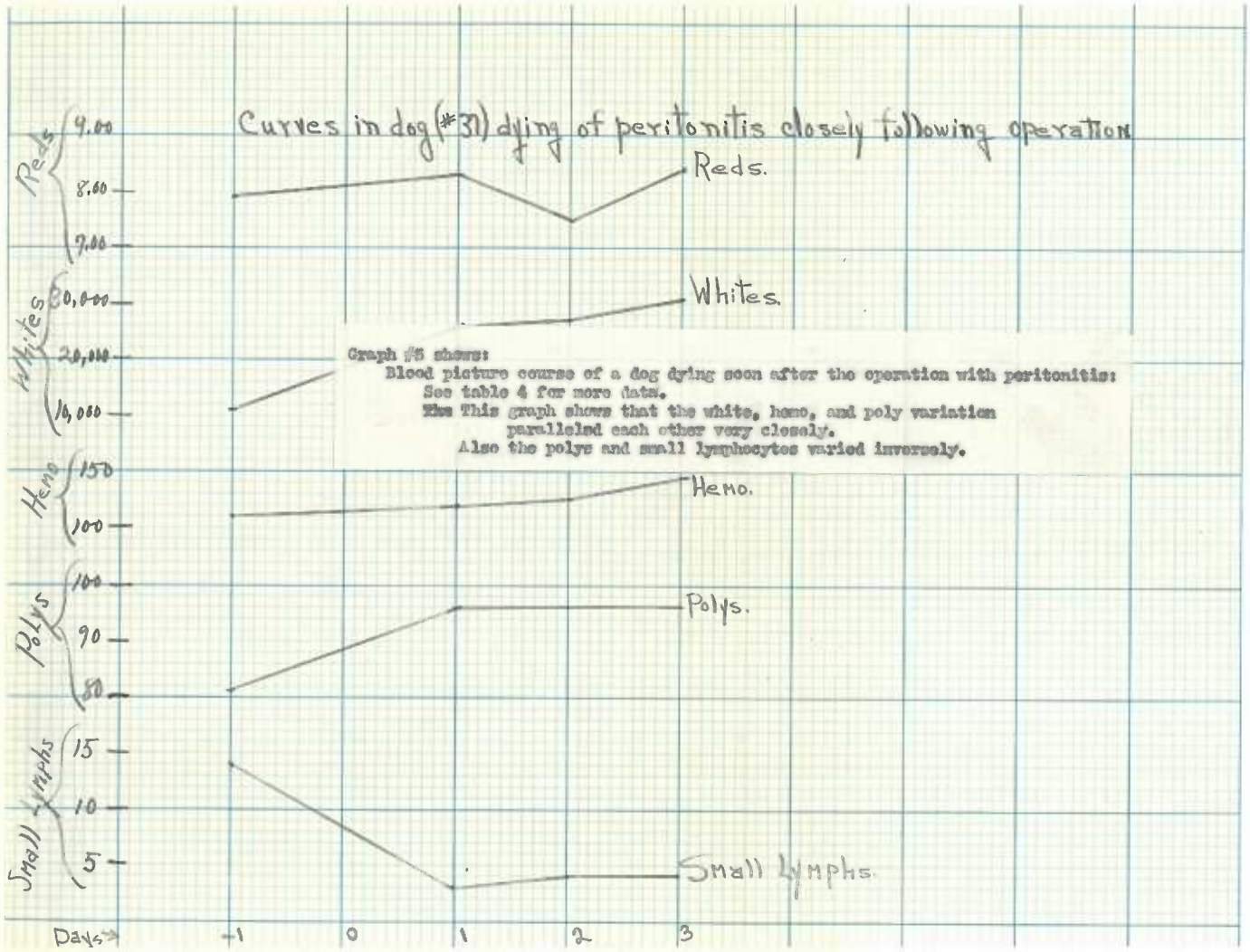
Table 5.

Table of final counts taken on dogs dying of peritonitis within one week following the operation.

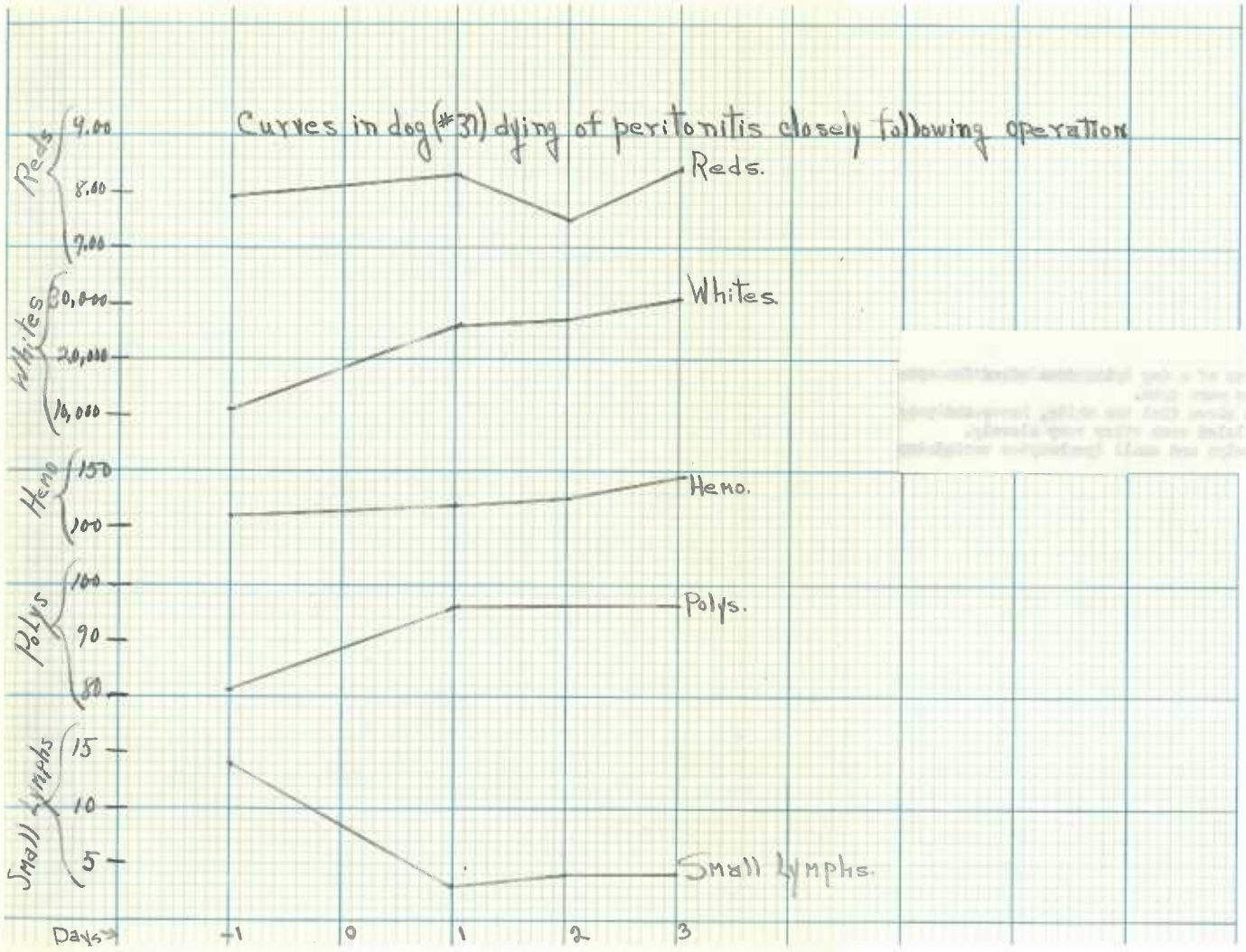
Dog No.	Post-oper. day of count. (ie when count taken)	Reds	Whites	Mono	Polys	Small lymph.	Others.	Length of life.
7.	1.	7.87	9500	84				2
8.	5.	10.93	7250	160	88	10	2	5.
17.	1.	9.48	20800	150	96	2	2	2. 1.
21.	4.	9.31	12,000	160	97	2	1	5
36.	2.	8.87	26,850	120	99	1		2 3
37	3	8.44	31,850	145	96	3	1	4
38	4	5.61	13,000	117	94	12	4	5
40	3	8.91	20,600	95	82	16	2	4
44	3	4.91	21,600	95	82	16	2	4
45	4	10.44	32,750	170	99	1		5
Averages:								
	3 day count:	8.10	19,600	151	91	6	3	3.8

This table therefore shows:

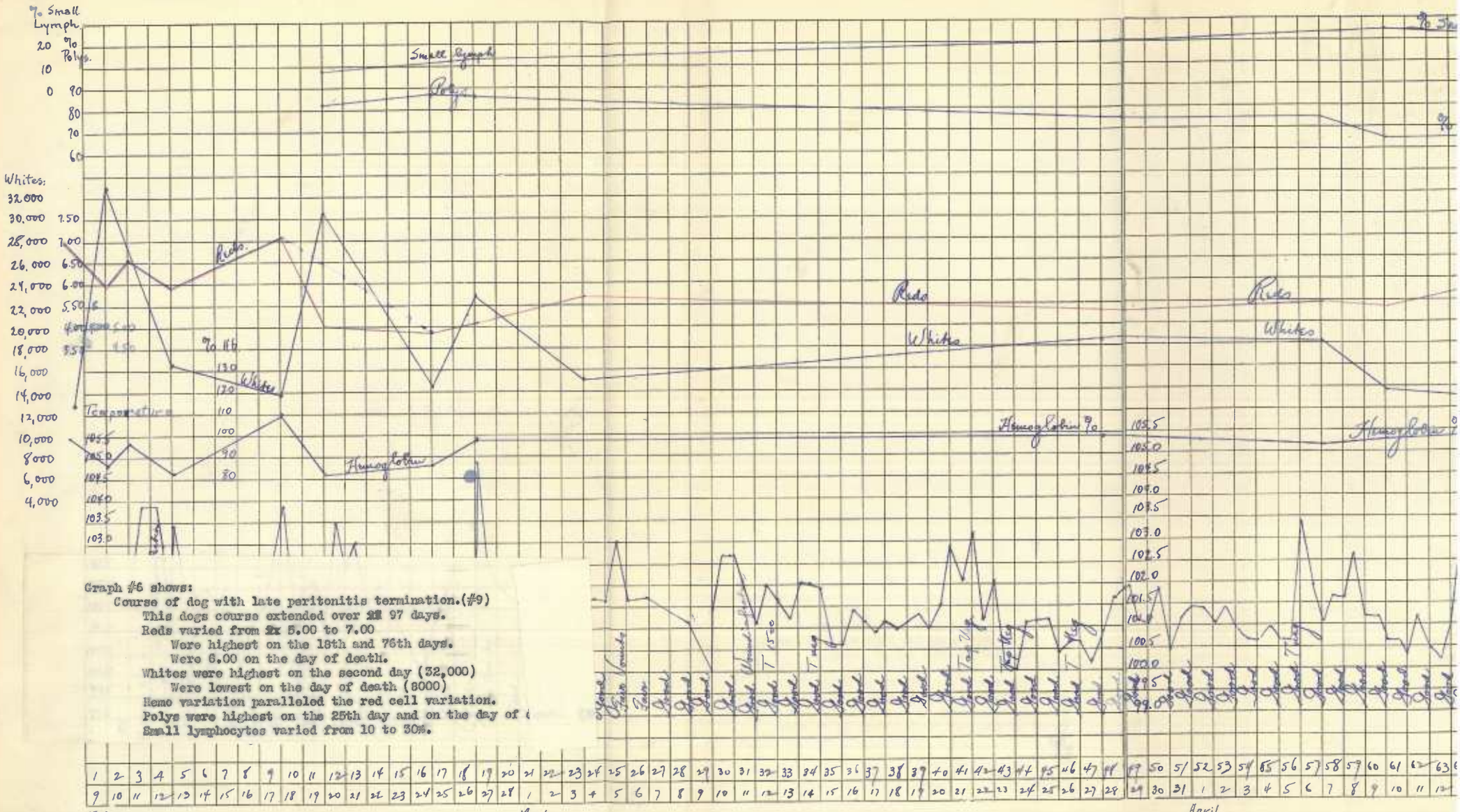
1. Averages final count on dogs dying of peritonitis early (within one week):
   - Reds: 8.10
   - Whites: 19,600
   - Mono: 151%
   - Polys: 91%
   - Small lymph. 6%
2. Average death from early peritonitis occurred on the 4th day.



Graph #5 shows:
Blood picture course of a dog dying soon after the operation with peritonitis:
See table 4 for more data.
~~The~~ This graph shows that the white, hemo, and poly variation paralleled each other very closely.
Also the polys and small lymphocytes varied inversely.

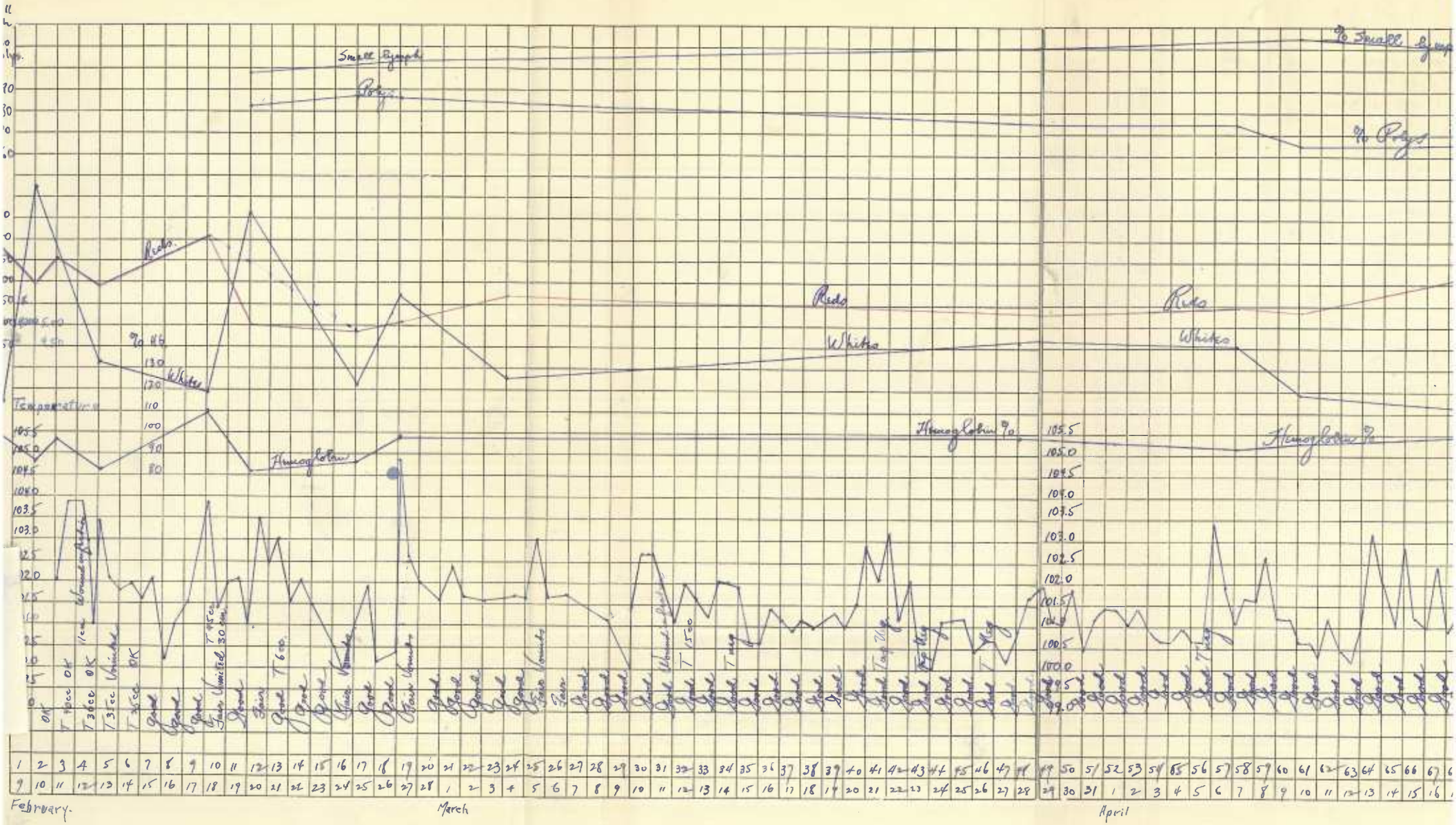

Curves in dog (#31) dying of peritonitis closely following operation
Reds
9.00
8.00
7.00
Whites
30,000
20,000
10,000
Heno
150
100
Polys
100
90
80
Small Lymphs
15
10
5
Days
-1
0
1
2
3
Reds.
Whites.
Heno.
Polys.
Small Lymphs.

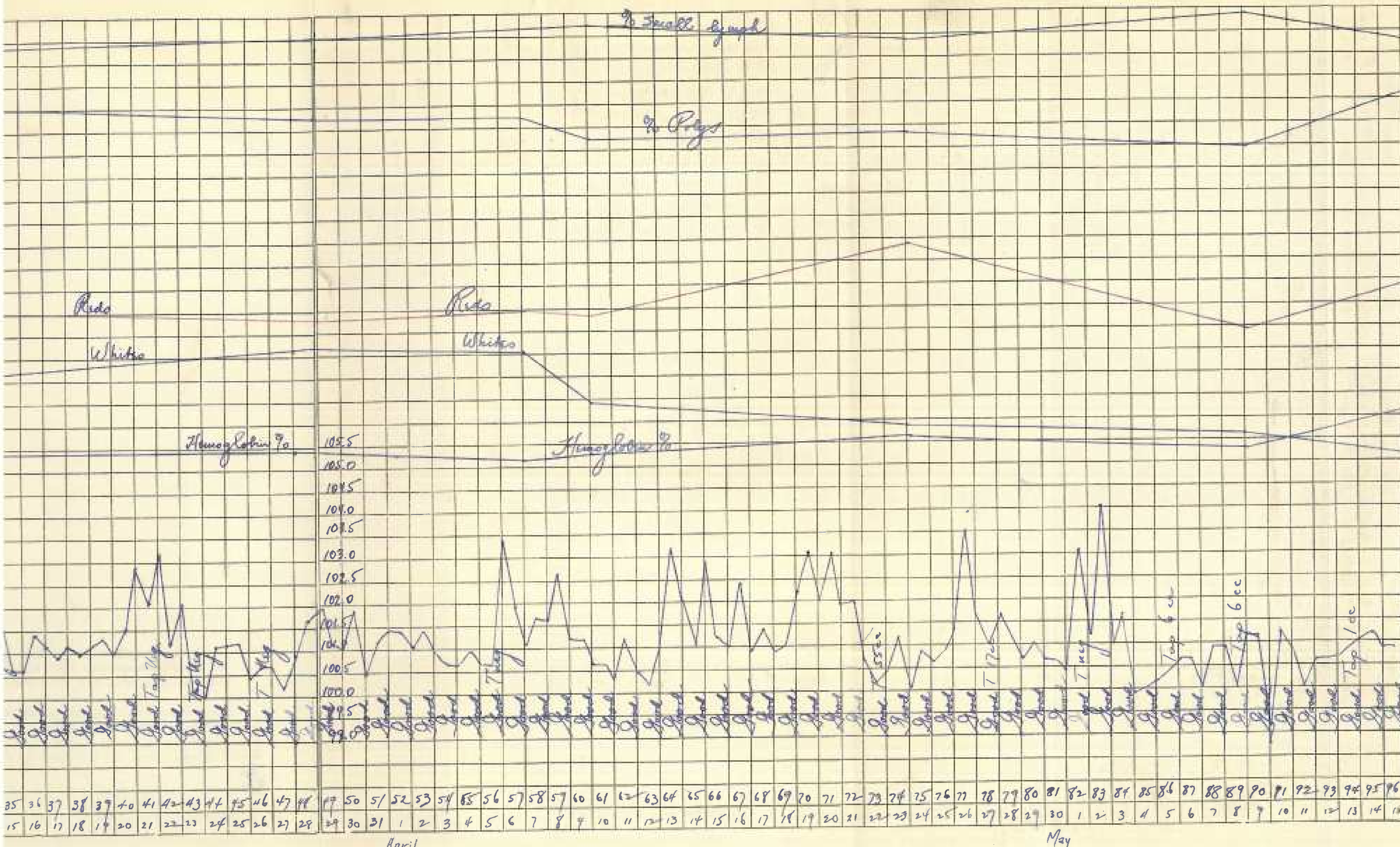
Dog #9 Operated 2-9-29



Graph #6 shows:
Course of dog with late peritonitis termination.(#9)
This dogs course extended over 97 days.
Reds varied from 5.00 to 7.00
Were highest on the 18th and 76th days.
Were 6.00 on the day of death.
Whites were highest on the second day (32,000)
Were lowest on the day of death (8000)
Hemo variation paralleled the red cell variation.
Polys were highest on the 25th day and on the day of
Small lymphocytes varied from 10 to 30%.

Operated 2-9-29.





Sick & died

At autopsy:-
Fluid in peritoneal cavity
Omentum hemorrhagic
Perforated loop.
Omentum around mesenteric vessels

Anastomosis OK
Cause of death:
Peritonitis from ruptured loop

Table 6.

Comparison of normal type, infection type, and peritonitis type of recovery as far as the blood picture curves are concerned:

Reds:

Normal type:

Show a gradual slight decrease, say, e.g. 7 million to 6 million.
Any intermediate rise due to vomiting or dehydration.

Infection type:

Show a gradual slight decrease, say, e.g. 7 million to 6 million.
Any intermediate rise due to vomiting or dehydration.

Peritonitis type:

Approximately no change thru the course.
Sudden changes due to vomiting or dehydration.

Whites:

Normal type:

Maximum white count on the 4th to the 8th day.(23,000-40,000)
Gradually fell from the maximum down to about 10,000.

Infection type:

Maximum white count during the first 13 days of thecourse.About 23,500.
Minimum white count on the day of death. (About 4000)
Somewhat saw tooth white cell course during the first 13 days.

Peritonitis type:

Maximum on the 1st to 4th days. (Around 30,000)

Hemo:

Normal type:

Has gradually fallen from 110 to 90.

Infection type:

Has gradually fallen from 110 to 90.

Peritonitis type:

Hemo has gradually increased up to the date of death.

Polys:

Normal type:

Gradually rose to about 95 on the 9th day and then gradually fell back to normal.

Infection type:

Maximum on the 4th day.
Minimum on the day of death.

Peritonitis type:

Polys maximum,(95-98) on the day of death.
Showed a gradual increase up to the day of death.

~~Small lymphocytes:~~

Small lymphocytes:

Normal type:

Show a gradual fall from 25 to about 10.

Infection type:

Show a gradual rise from 4-26 thruout the course.

Peritonitis type:

Small lymphocytes gradually fell from about 14 to 3.

Inter-relationships:

Normal type:

Reds, whites, hemo, and polys parallelm each other.
Small lymphocytes vary inversely with these.

Infection type:

Reds and hemo parallel each other.
Whites and polys parallel each other.
In the first half of the course the whites varied with the reds, and in the latter part they varied inversely with the reds.
Polys gradually fell as the small lymphocytes gradually rose.

Peritonitis type:

Reds, whites, hemo, and polys seem to parallelm ~~each other~~ closely.
Polys vary inversely with the small lymphocytes.

Table 7.

Daily temperatures (taken at 8AM daily, per rectum) of operated dogs.

Dog No.	On day of operation.	On 1st day	On second day	On 3rd day	On 4th day	On 5th	On 6th.
10.	99	102	102.2	102.8	102.2	102	100.4
11.			100.9	103.9	99.7		
12.		102.3	103.5	102	101.6	101.2	101.7
13.	100.5	101.0	101.8	102.5	102	101.8	100.6
14.			102.6				
15.		100.8	101.3	101.6	102.2	102	102
16		102	103.6	100.5	102	101.4	
17		102.6					
18		101.4	103.8				
19.		100.6					
20.		100	100.6	102.4	100.8	100.4	101.4
21.		100	100.6	101.4	100.8	100.4	101.4
22.		102.8	103				
23.		101.4	102.3	101.4	102	101.6	
24.		101.0	101.2	101.2	103.8		
25.		100.8					
26.		101.4	101.6	101.6	103	100.8	103.6
27.		101.8					
28.		102.4	103.6				
30.		99.2	102.4	103			
31.		100.6	101.8	102	101.4	100.6	101.4
32.		101.5	101.6	100.8	100.7	100.4	101.
33.		101.4	101	101	101.2	100.8	99.7
34.	100.4	101.6	105.6				
35.		99.6	100.6	100	101	100	100.3
36.	100.8	101.3	102.4	102.2			
37.	100.6	100.4	101.2	102.8	106		
38		99.2	101.6	100.6	101.2	101.4	
Averages:	100.2	101.0	102.4	101.7	101.9	101.4	101.2

Using findings from dogs of the entire series as shown above:

Average daily temperature prior to the operation: 100.2

Average daily temperature on the first post-operative day: 101.0

" " " " second " " " : 102.4

" " " " third " " " : 101.7

" " " " fourth " " " : 101.9

" " " " fifth " " " : 101.4

" " " " sixth " " " :101.2

In brief the results here show:

Maximum post-operative temperature is on the second postoperative day.

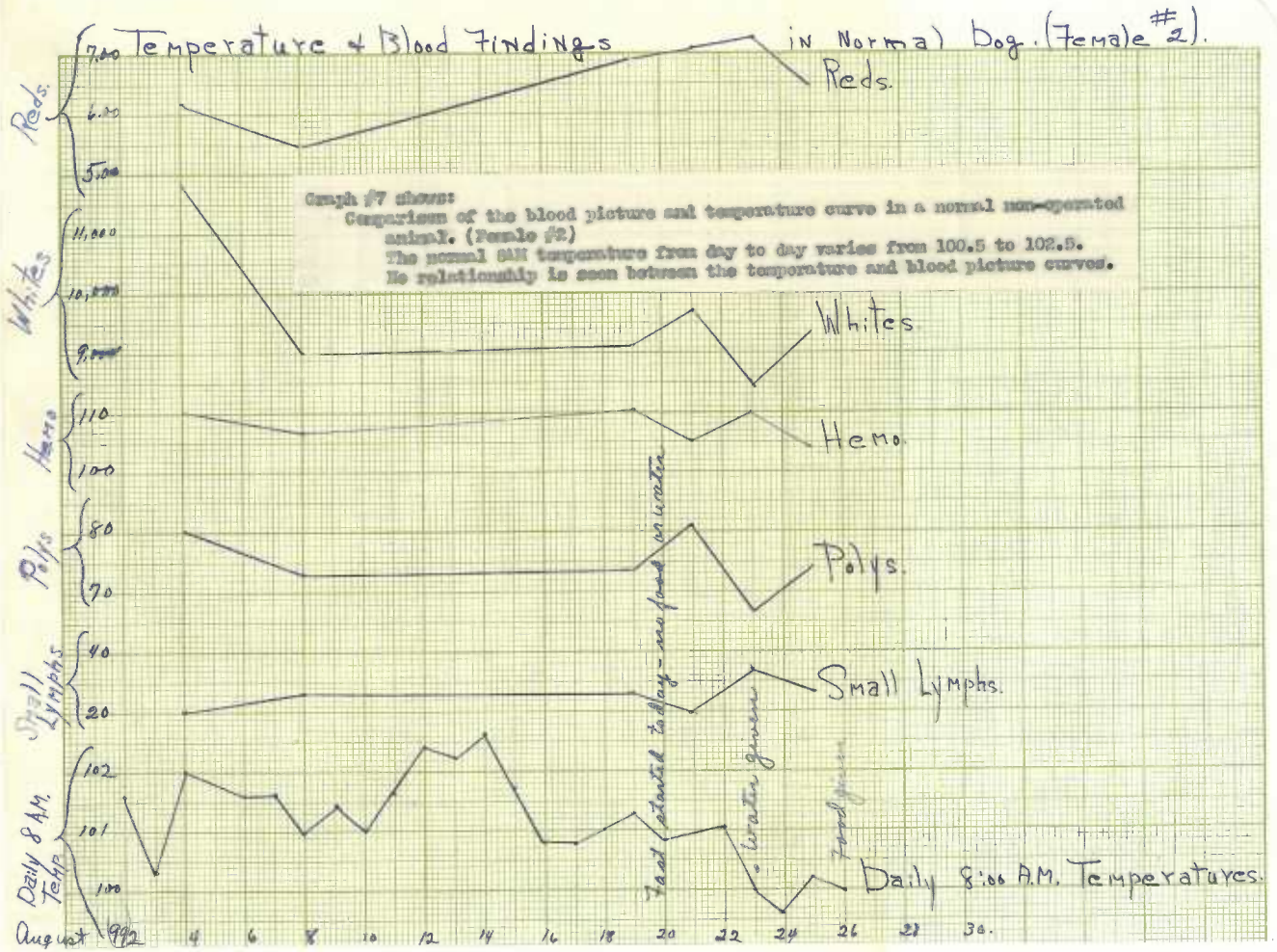
Following this the temperature then remains about 1 degree above normal out as far as the 6th day.

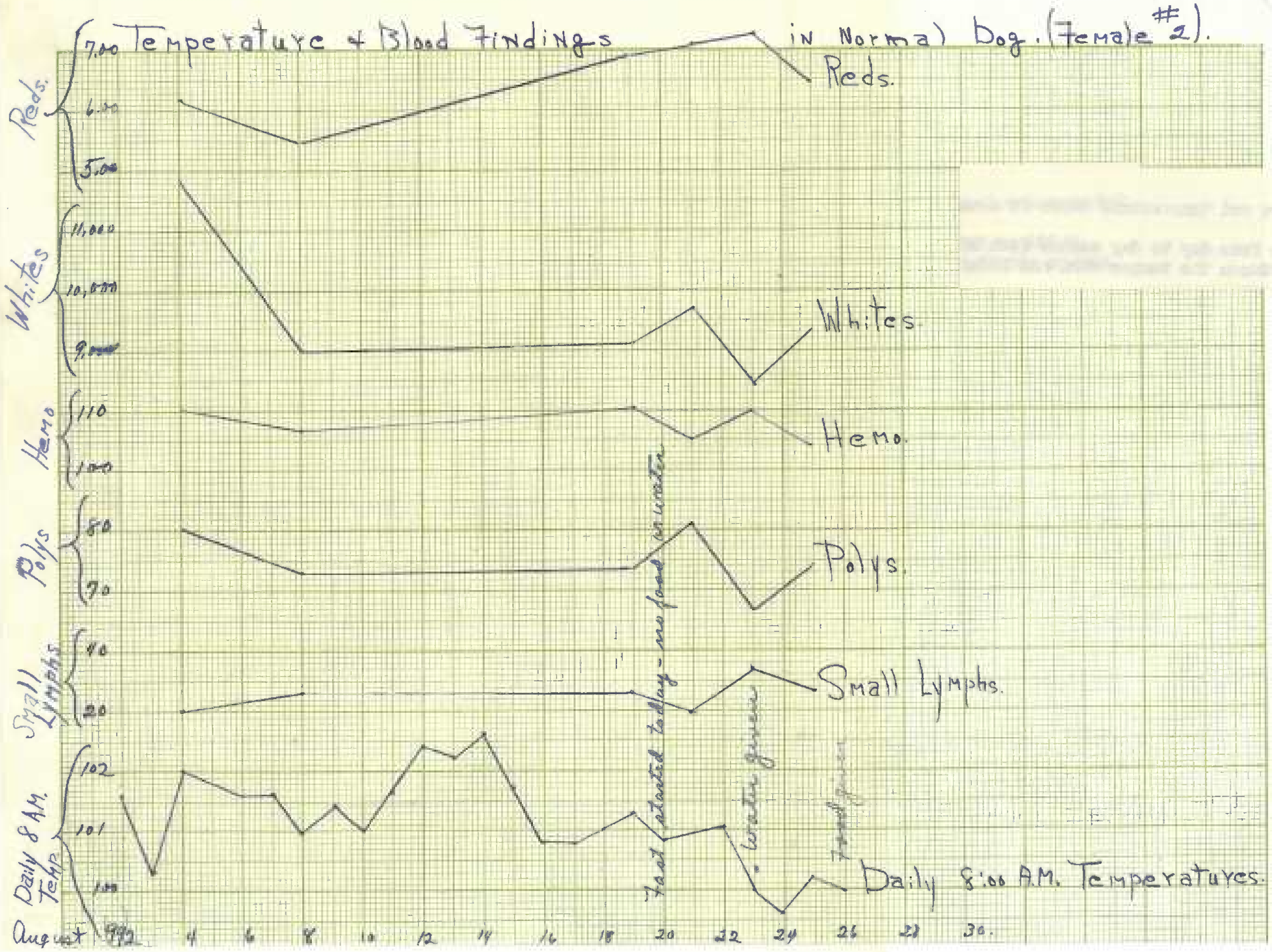
Table 8.

Temperature findings in a normal non-operated animal.

Female control #2.

August 2, 1929.-	101.6
3	100.3
4	102.0
5	
6	101.6
7	101.6
8	101.0
9	101.4
10	101.0
11.	101.6
12.	102.4
13.	102.2
14.	102.6
15.	101.7
16.	100.8
19.	101.3
20.	100.8
21.	102.6
22.	101.0
23.	100.0
24	99.6
25	100.2
26	100.0
Average	101.2


Temperature & Blood Findings in Normal Dog. (Female #2).
Reds.
Whites
Hemo
Polys
Small Lymphs
Daily 8 A.M. Temp
August
Graph #7 shows:
Comparison of the blood picture and temperature curve in a normal non-operated animal. (Female #2)
The normal 8AM temperature from day to day varies from 100.5 to 102.5.
No relationship is seen between the temperature and blood picture curves.
Reds.
Whites.
Hemo.
Polys.
Small Lymphs.
Daily 8:00 A.M. Temperatures.
Fast started today - no food or water
Water given
Food given


Temperature & Blood Findings in Normal Dog. (Female #2).
Reds.
Whites.
Hemo.
Polys.
Small Lymphs.
Daily 8:00 A.M. Temperatures.
Reds
7.00
6.00
5.00
Whites
11,000
10,000
9,000
Hemo
110
100
Polys
80
70
Small Lymphs
40
20
Daily 8 A.M. Temp.
102
101
100
August
4
6
8
10
12
14
16
18
20
22
24
26
28
30.
Fast started today - no food or water
water given
Food given

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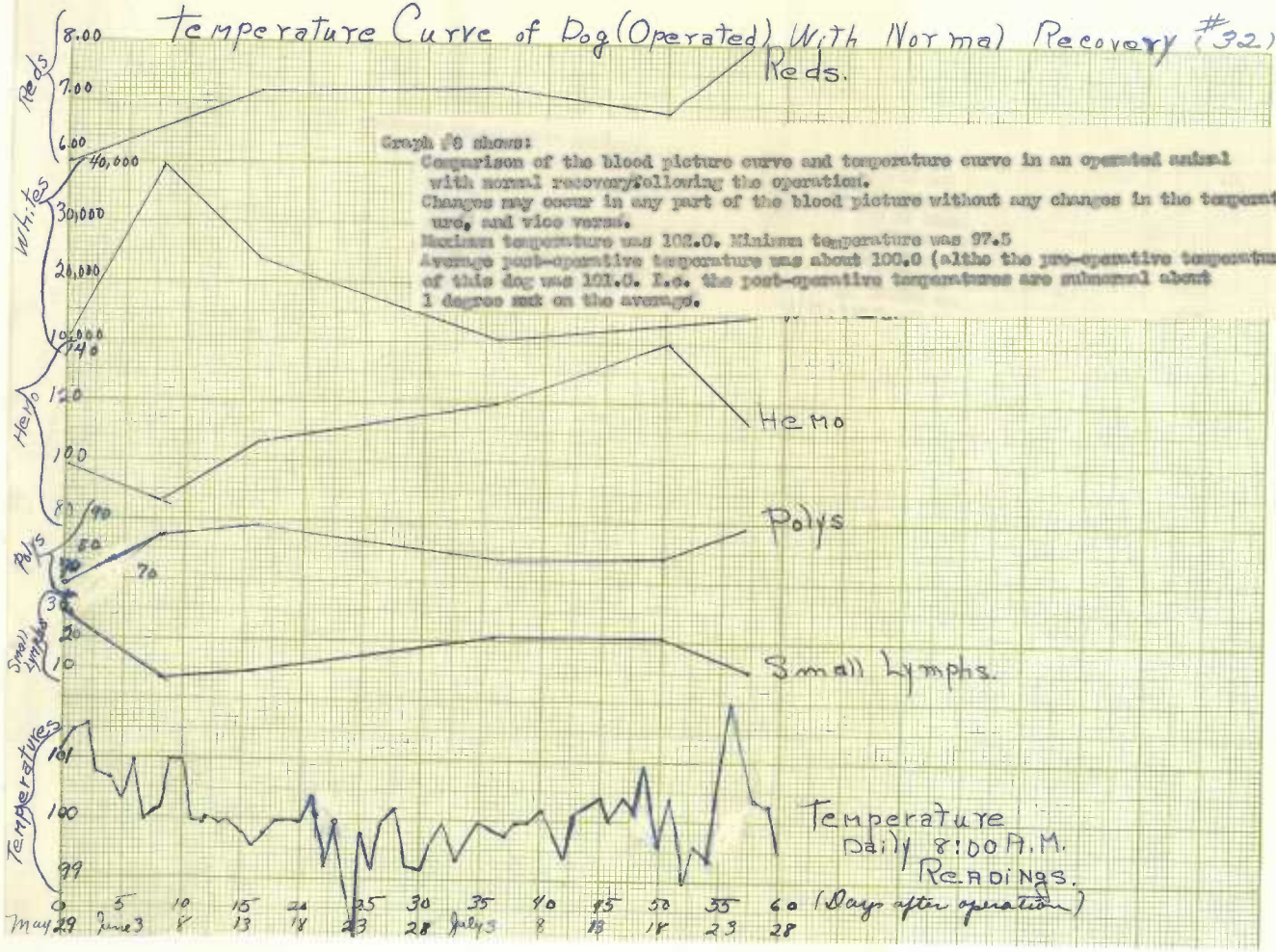
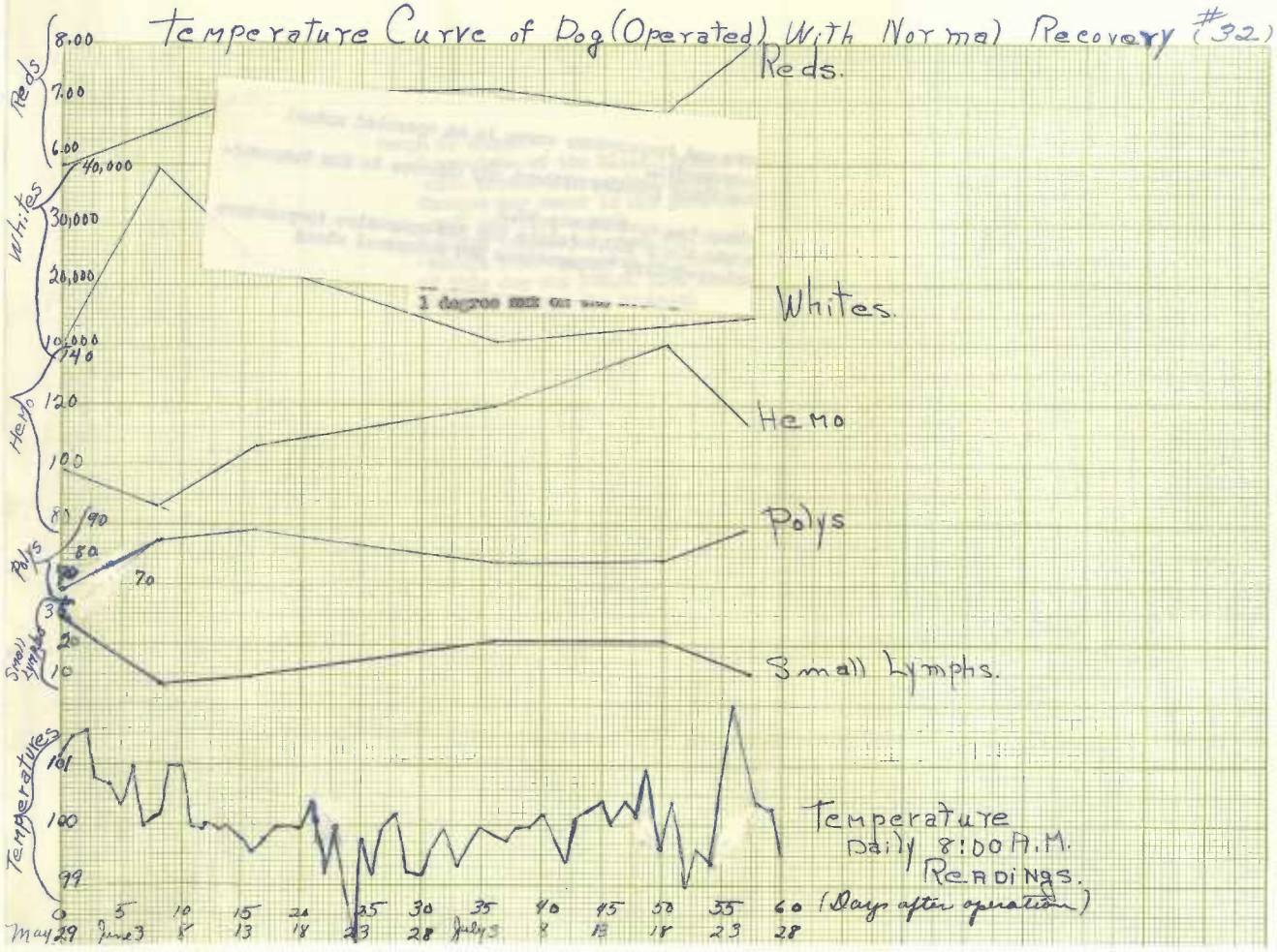
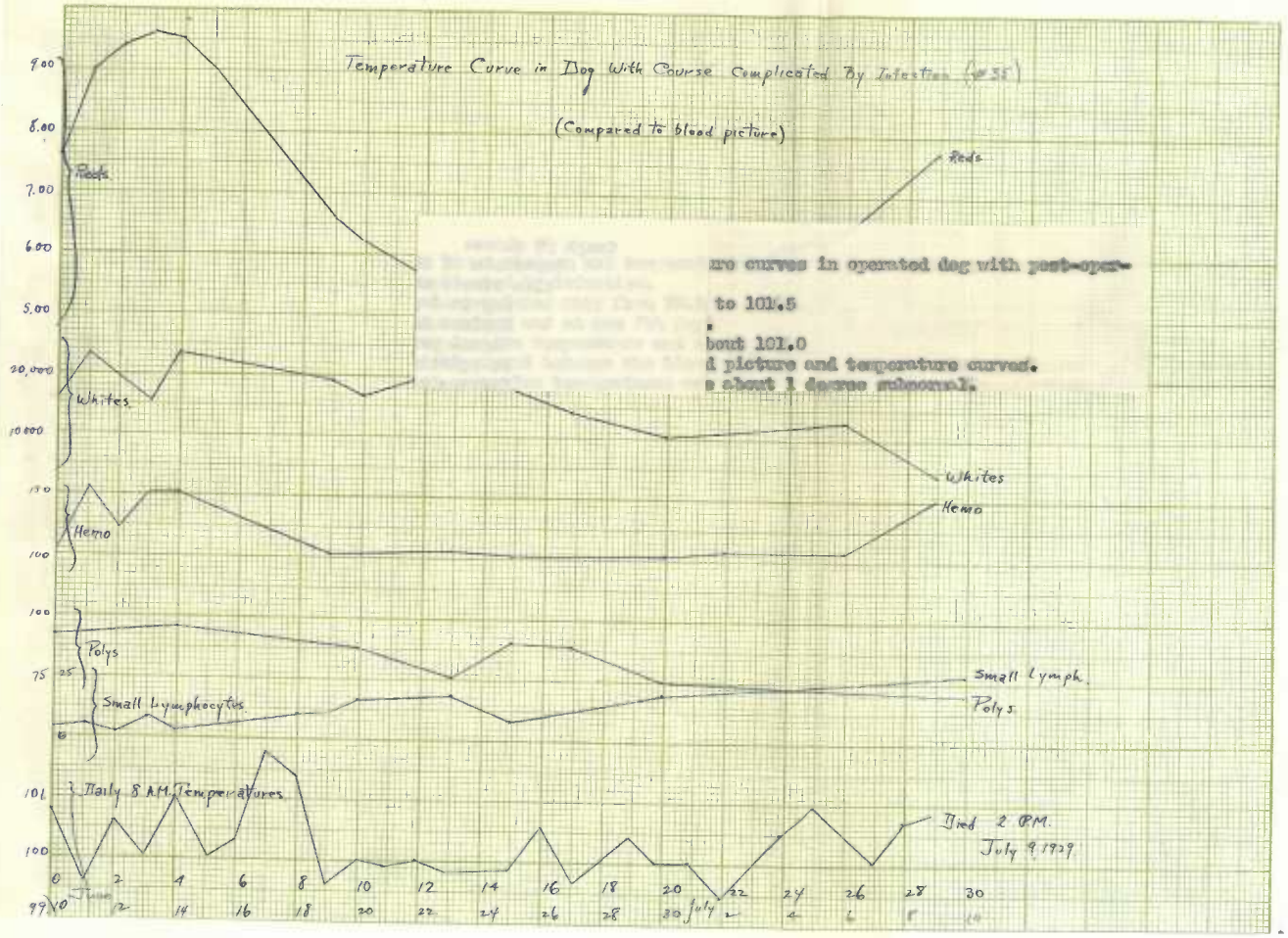
Temperature Curve of Dog (Operated) With Normal Recovery (#32)



Graph #8 shows:
Comparison of the blood picture curve and temperature curve in an operated animal with normal recovery following the operation.
Changes may occur in any part of the blood picture without any changes in the temperature, and vice versa.
Maximum temperature was 102.0. Minimum temperature was 97.5
Average post-operative temperature was about 100.0 (altho the pre-operative temperature of this dog was 101.0. I.e. the post-operative temperatures are subnormal about 1 degree each on the average.


Temperature Curve of Dog (Operated) With Normal Recovery (#32)
Reds
8.00
7.00
6.00
Reds.
Whites
40,000
30,000
20,000
10,000
Whites.
Hemo
140
120
100
80
Hemo
Polys
90
80
70
Polys
Small Lymphs
30
20
10
Small Lymphs.
Temperatures
101
100
99
Temperature
Daily 8:00 A.M.
Readings.
0 5 10 15 20 25 30 35 40 45 50 55 60 (Days after operation)
May 29 June 3 8 13 18 23 28 July 3 8 13 18 23 28



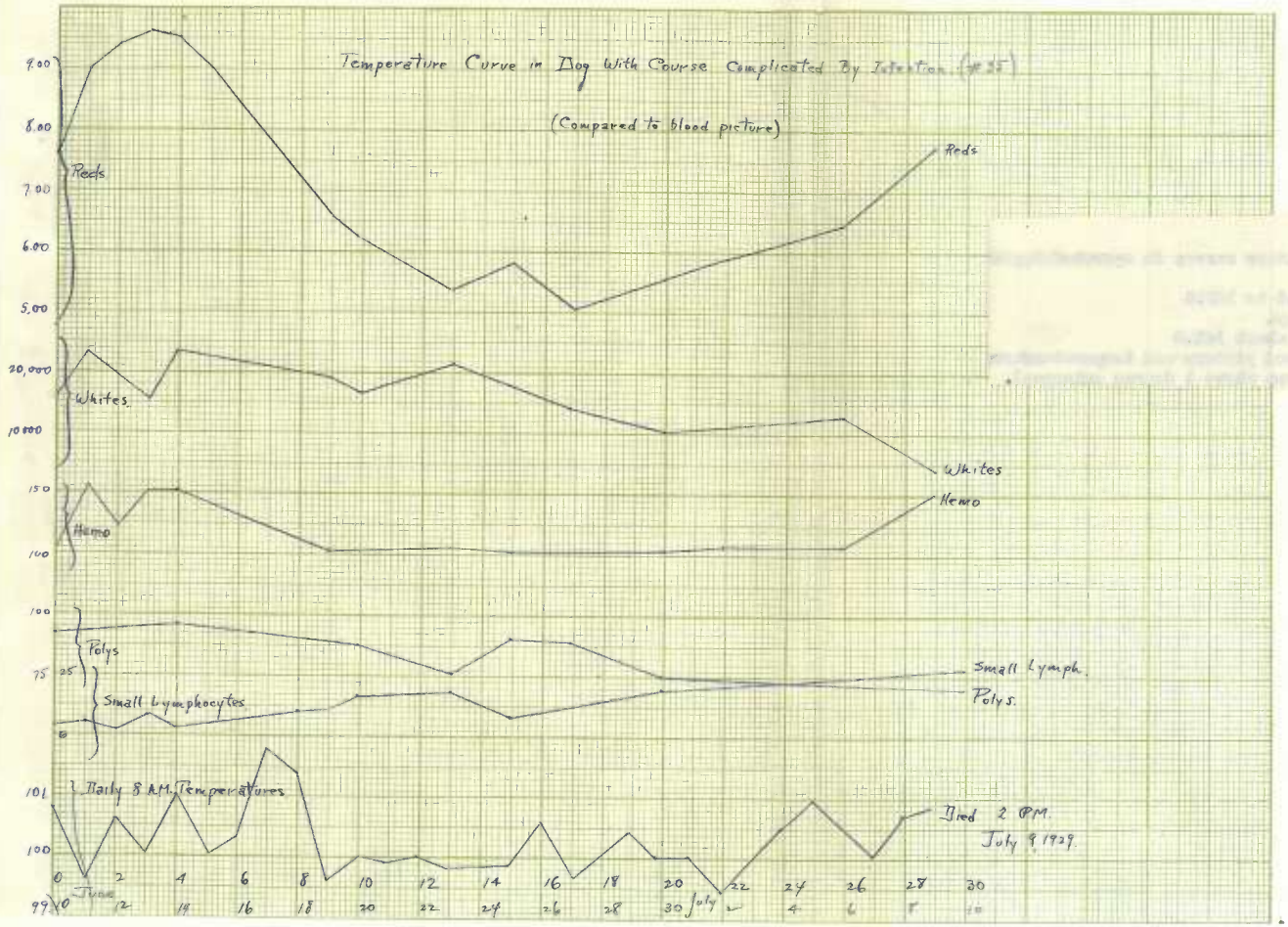
ro curves in operated dog with post-oper-

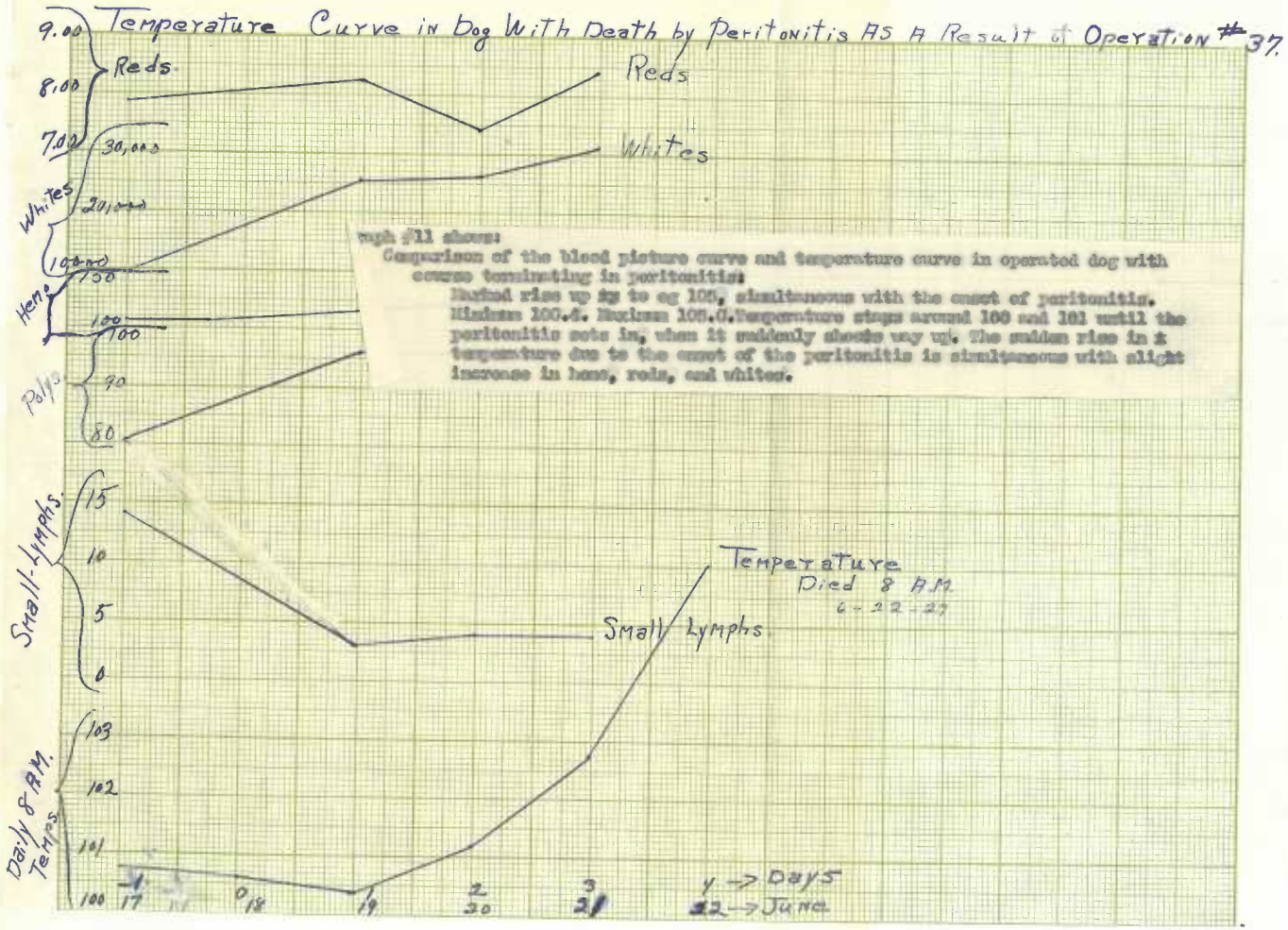
to 101.5

bout 101.0

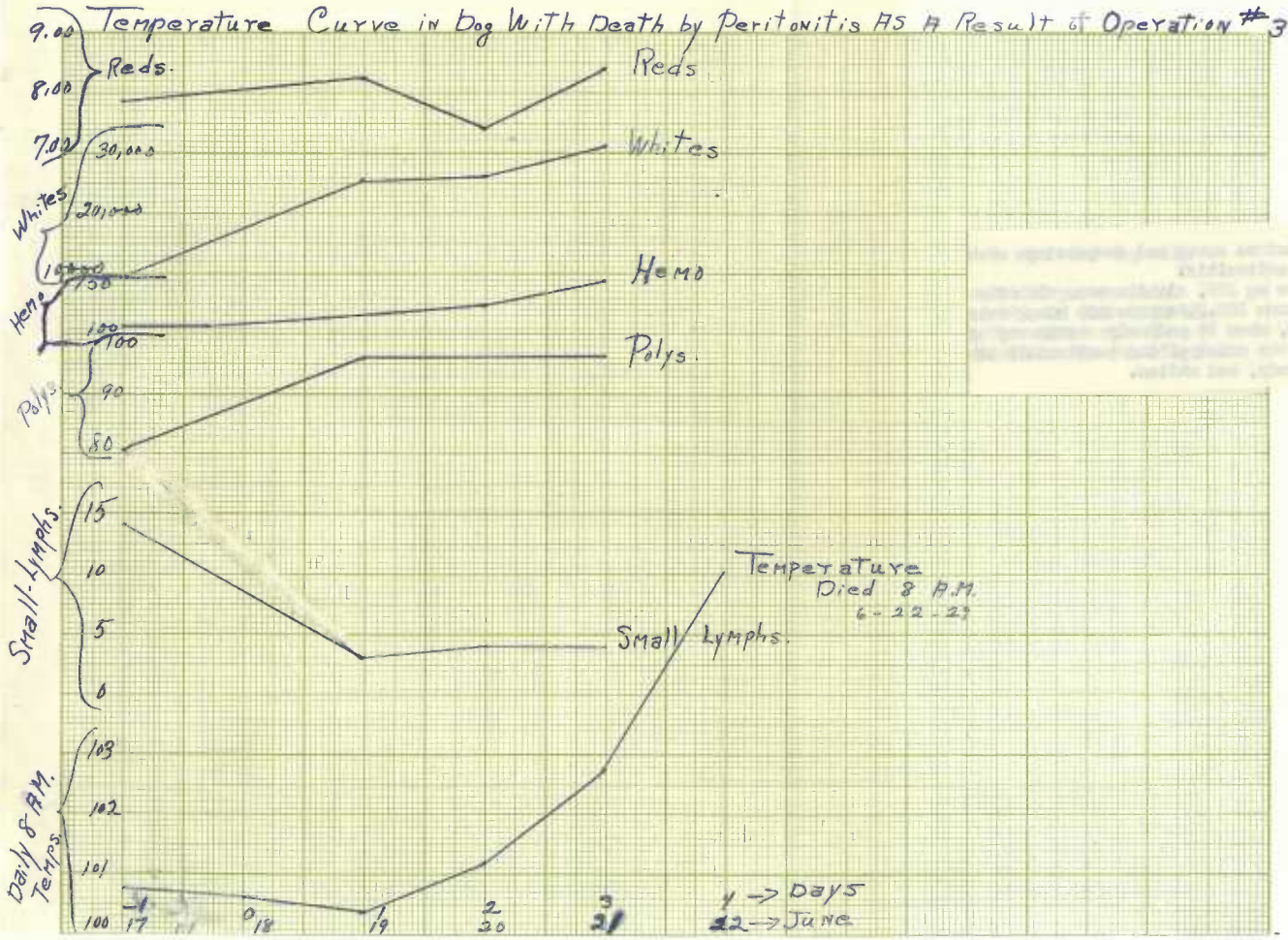
d picture and temperature curved.

e about 1 degree subnormal.

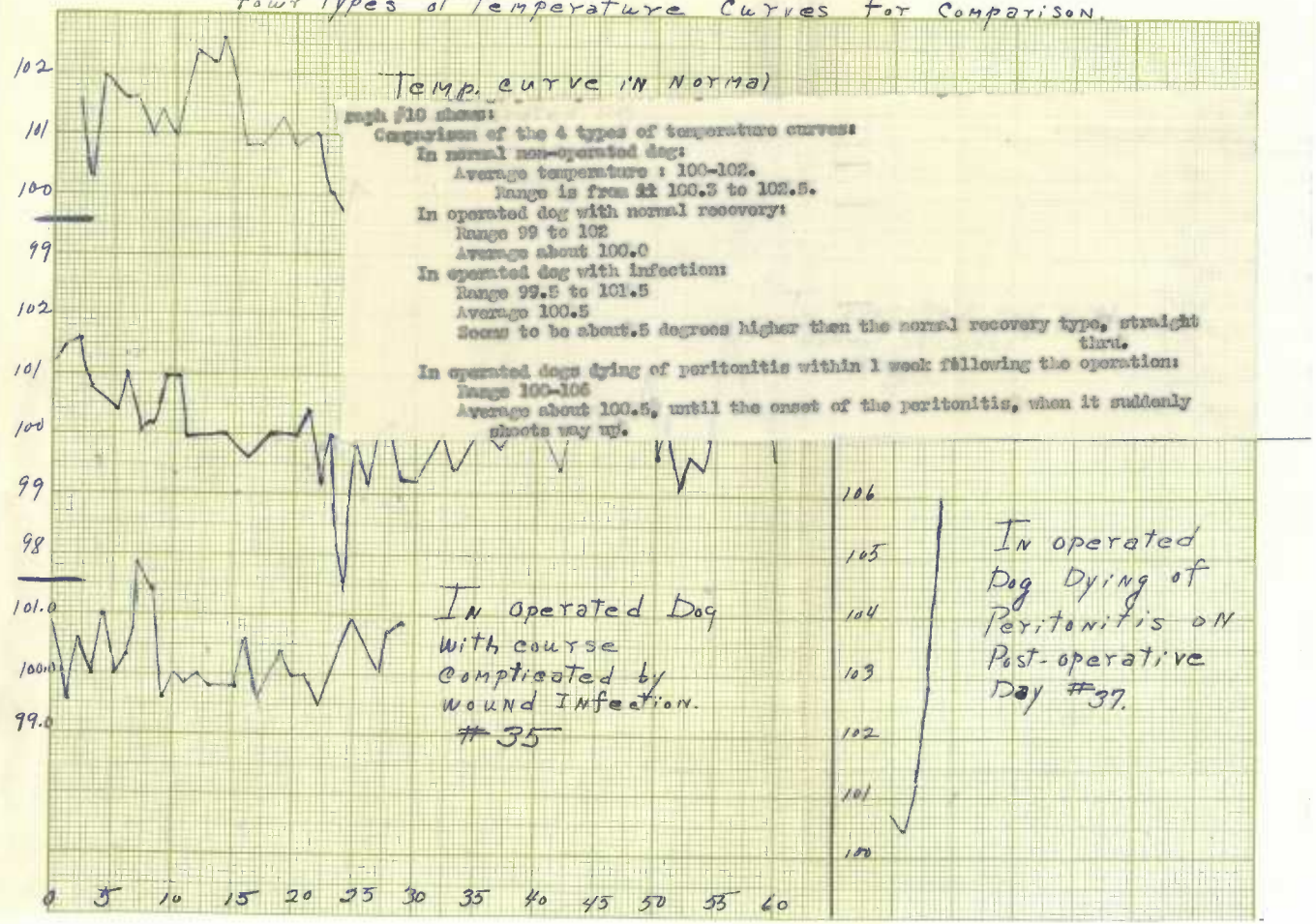

Temperature Curve in Dog With Course Complicated By Intention (p. 25)
(Compared to blood picture)
Reds
Whites
Hemo
Polys
Small lymphocytes
Daily 8 A.M. Temperatures
Reds
Whites
Hemo
Small Lymph.
Polys.
Died 2 P.M.
July 9 1929.
June
July



graph #11 shows:
Comparison of the blood picture curve and temperature curve in operated dog with course terminating in peritonitis:
Marked rise up #y to #g 105, simultaneous with the onset of peritonitis.
Minimum 100.4. Maximum 105.0. Temperature stays around 100 and 101 until the peritonitis sets in, when it suddenly shoots way up. The sudden rise in t temperature due to the onset of the peritonitis is simultaneous with slight increase in hems, reds, and whites.


Temperature Curve in Dog With Death by Peritonitis As A Result of Operation #37.
9.00
8.00
7.00
Reds.
Whites
30,000
20,000
Hemo
100
Polys.
90
80
Small Lymphs.
15
10
5
0
Daily 8 A.M. Temps.
103
102
101
100
Reds
Whites
Hemo
Polys.
Small Lymphs.
Temperature
Died 8 A.M.
6-22-27
17
18
19
20
21
22
1 -> Days
22 -> June

Four Types of temperature Curves for Comparison.



Temp. curve IN Normal

graph #10 shows:

Comparison of the 4 types of temperature curves:

In normal non-operated dog:

Average temperature : 100-102.

Range is from ~~it~~ 100.3 to 102.5.

In operated dog with normal recovery:

Range 99 to 102

Average about 100.0

In operated dog with infection:

Range 99.5 to 101.5

Average 100.5

Seems to be about.5 degrees higher then the normal recovery type, straight thru.

In operated dogs dying of peritonitis within 1 week following the operation:

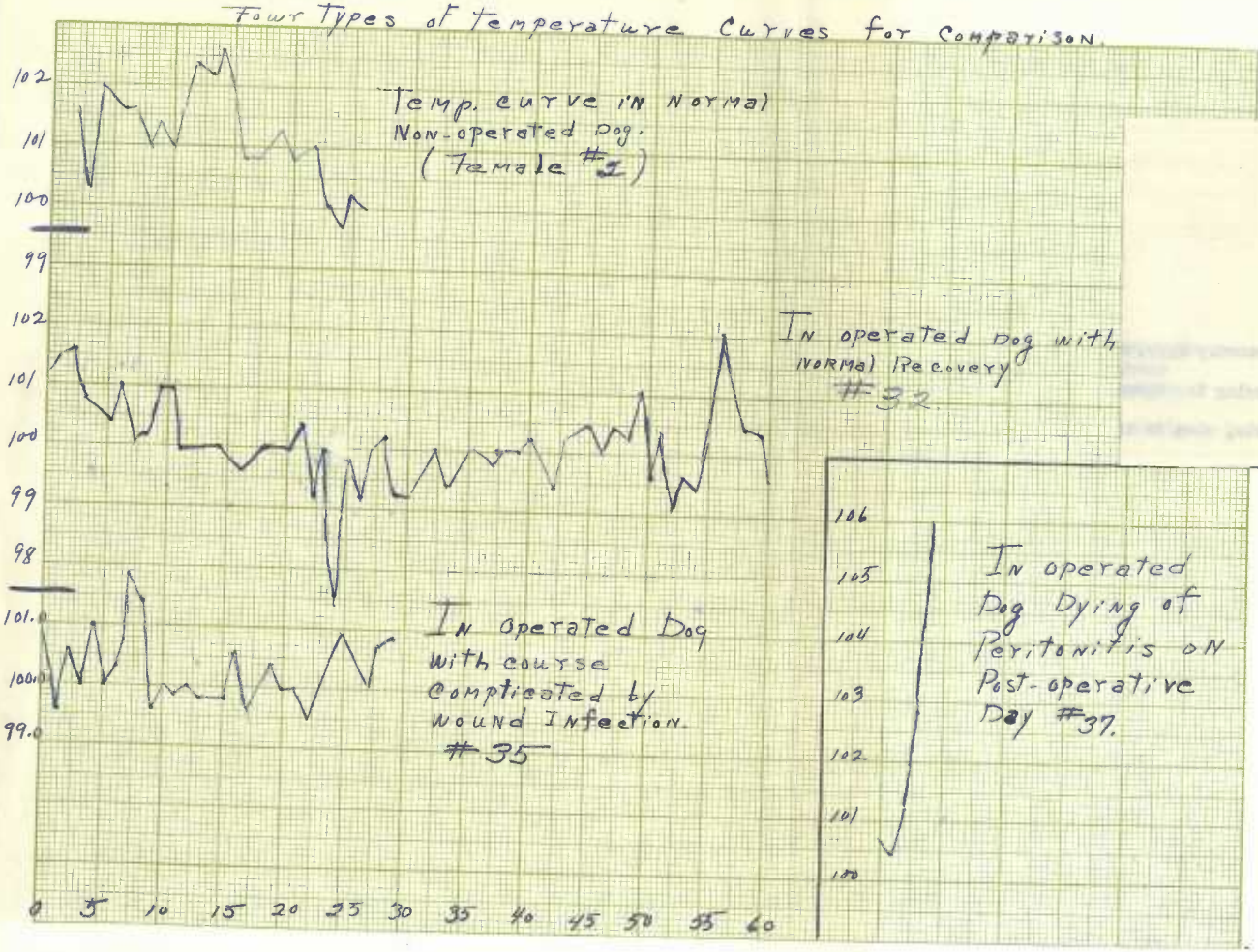
Range 100-106

Average about 100.5, until the onset of the peritonitis, when it suddenly shoots way up.

In operated Dog with course complicated by wound Infection. #35

In operated Dog Dying of Peritonitis on Post-operative Day #37.

Four Types of Temperature Curves for Comparison.



Temp. curve in Normal Non-operated Dog. (Female #2)

In operated Dog with Normal Recovery #32.

In operated Dog with course complicated by Wound Infection. #35

In operated Dog Dying of Peritonitis on Post-operative Day #37.

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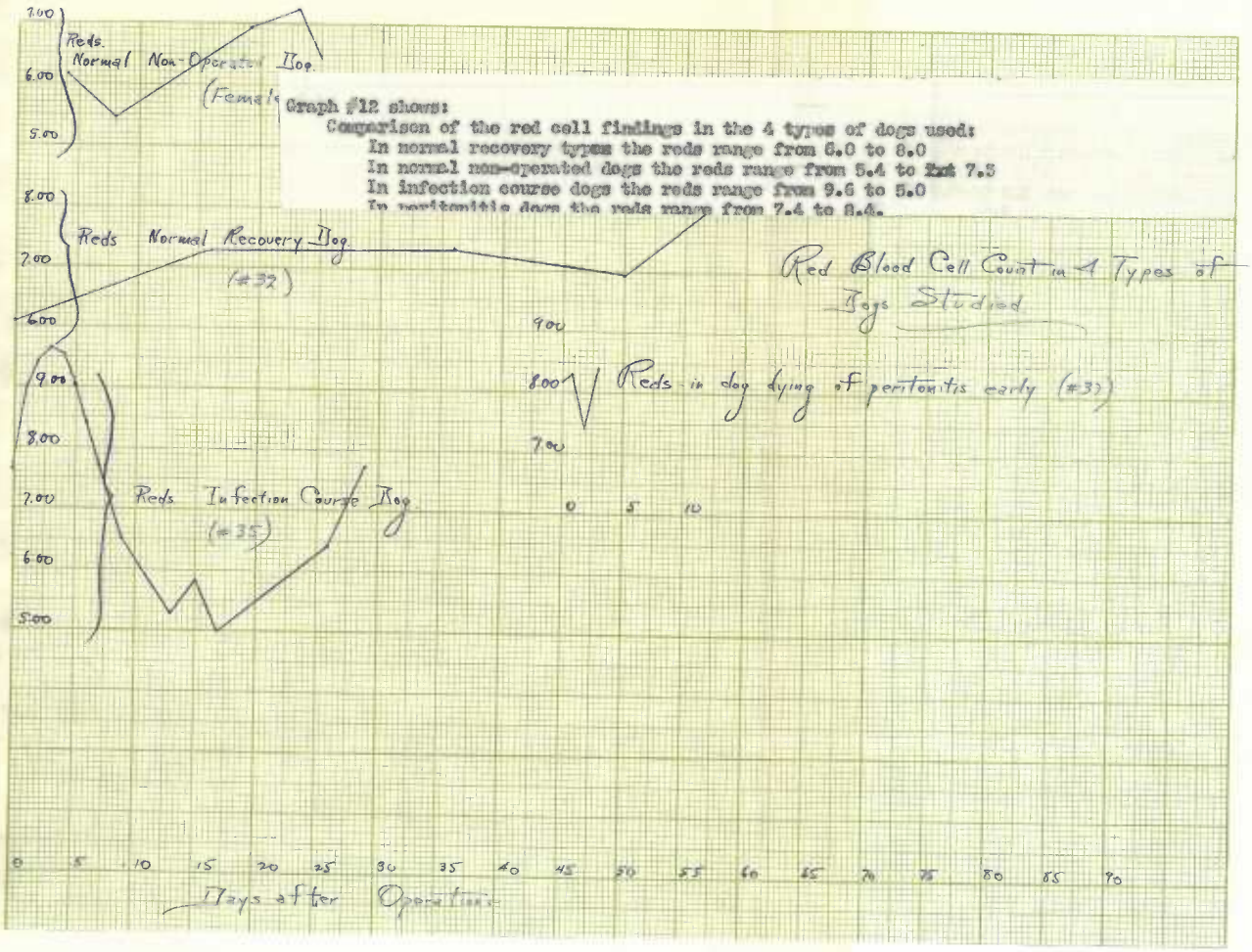
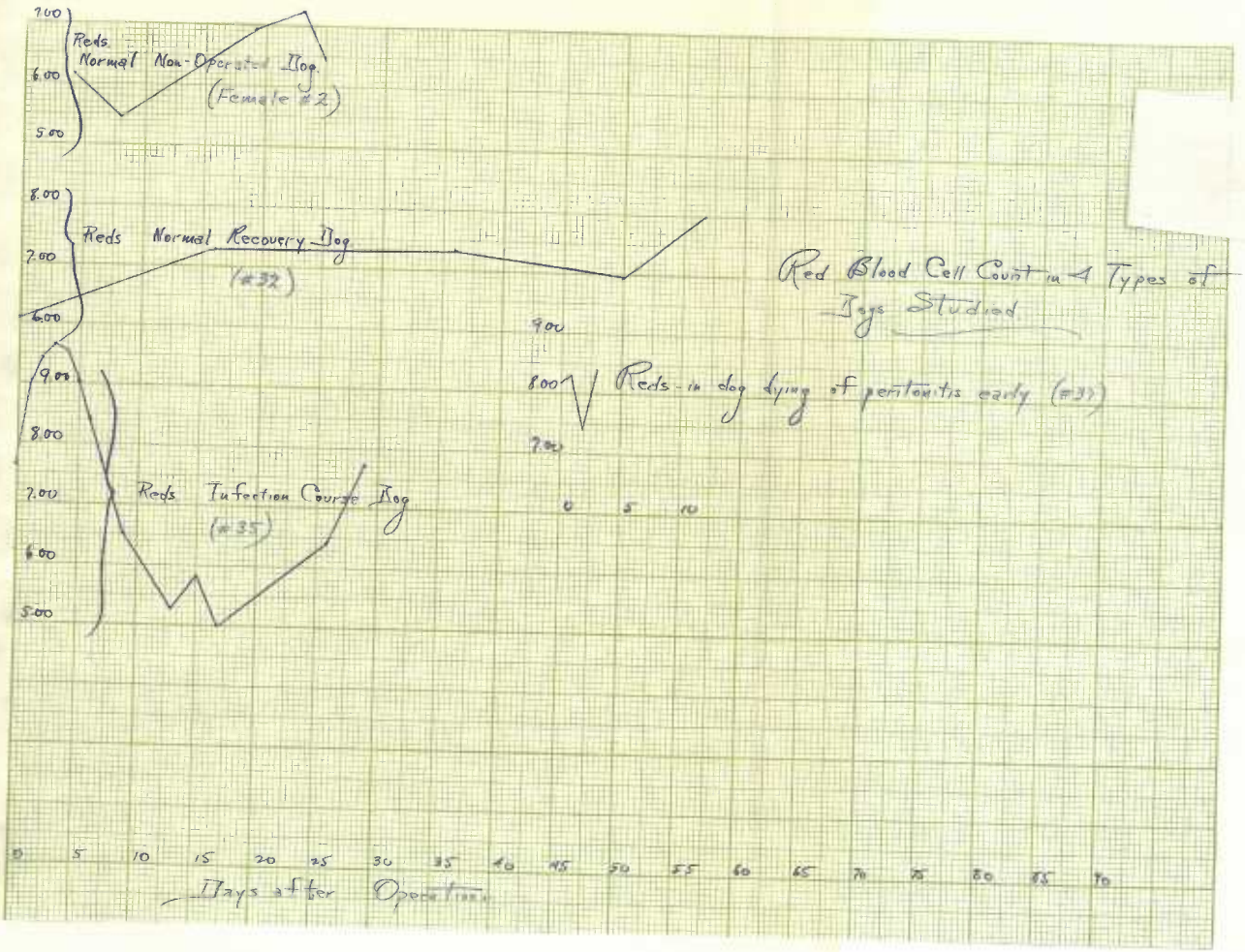
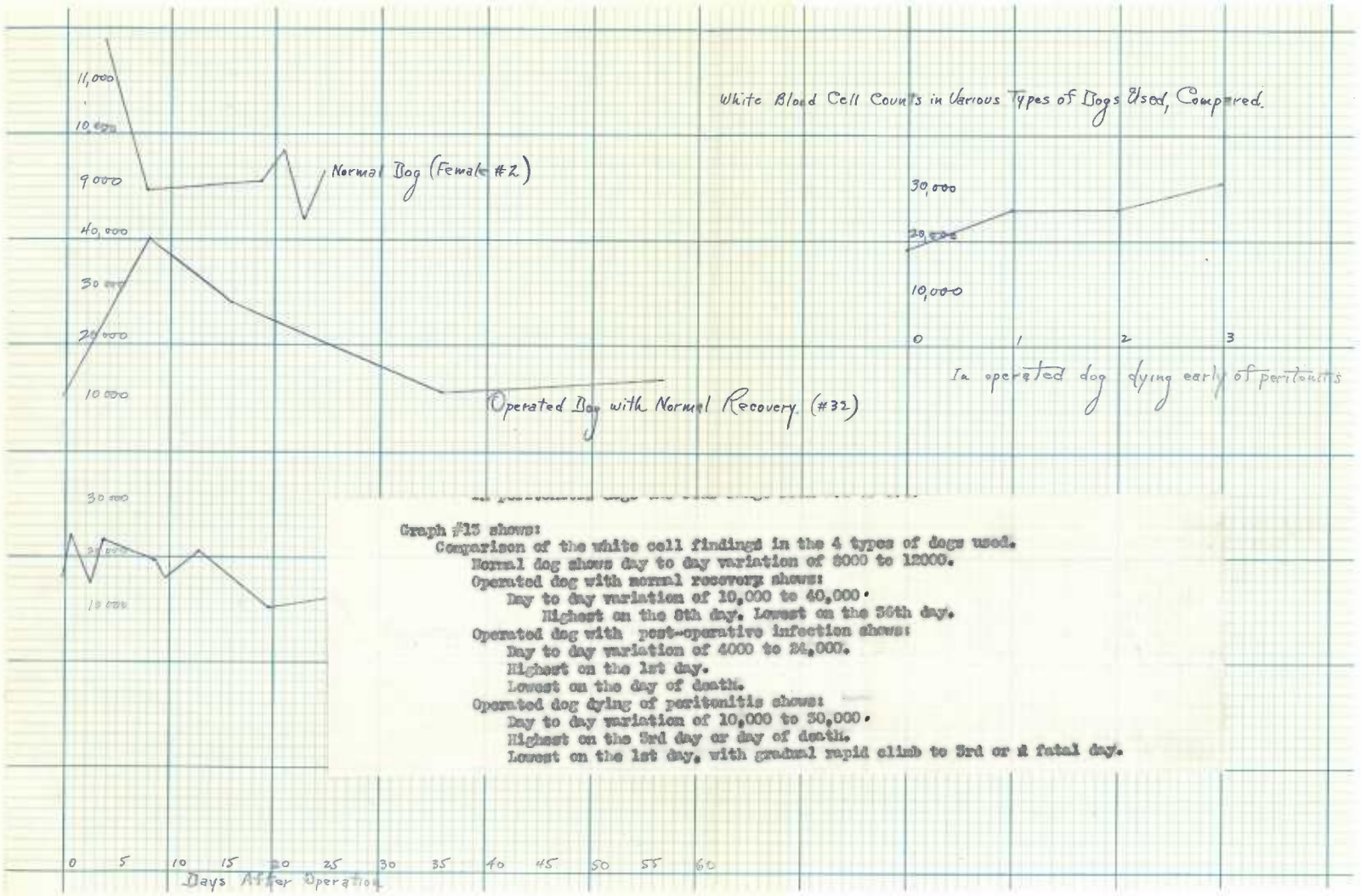


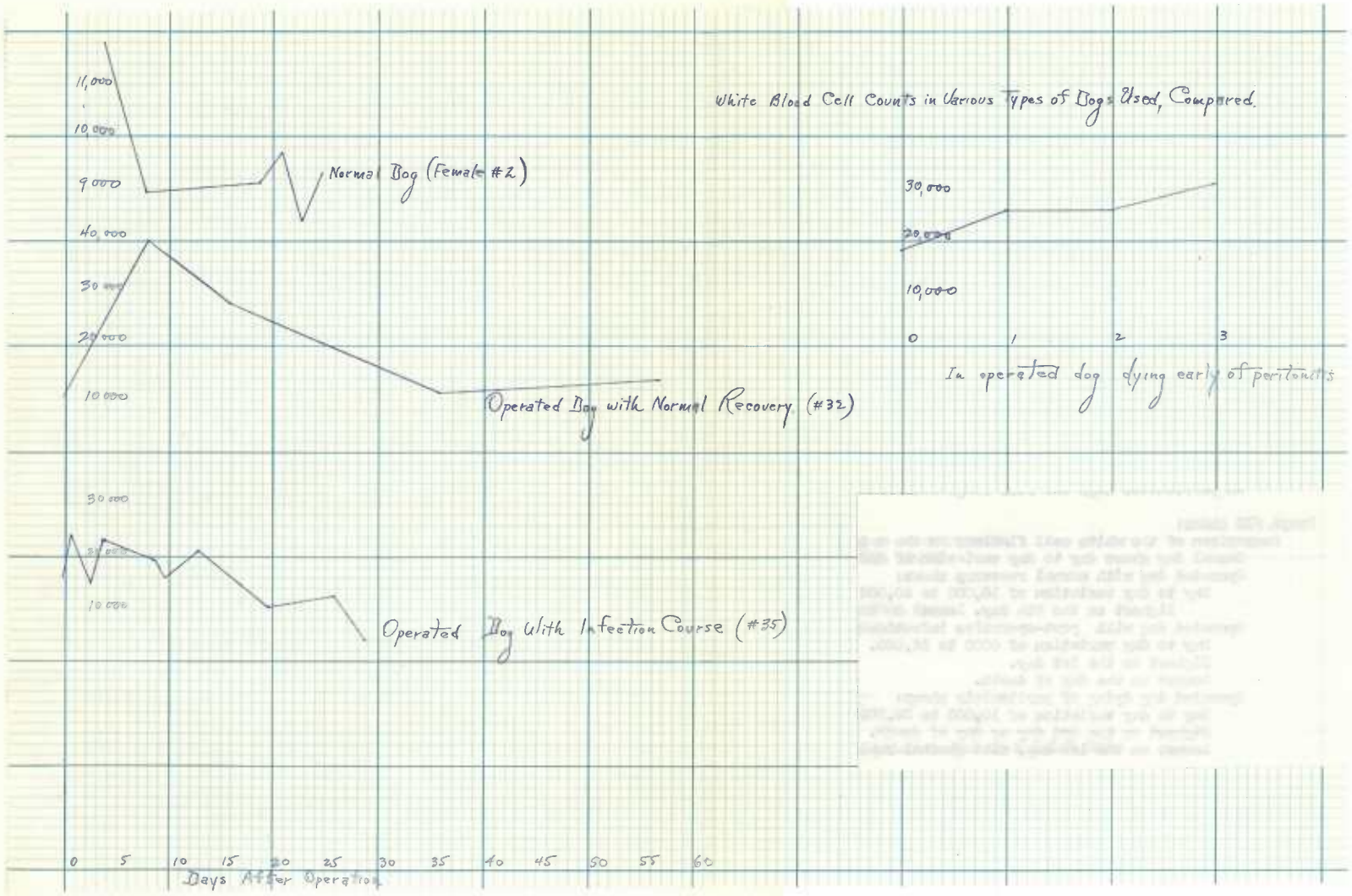
DIVISIONS PER INCH, NO. 418 CODEX BOOK CO., INC., NEW YORK, N. Y.

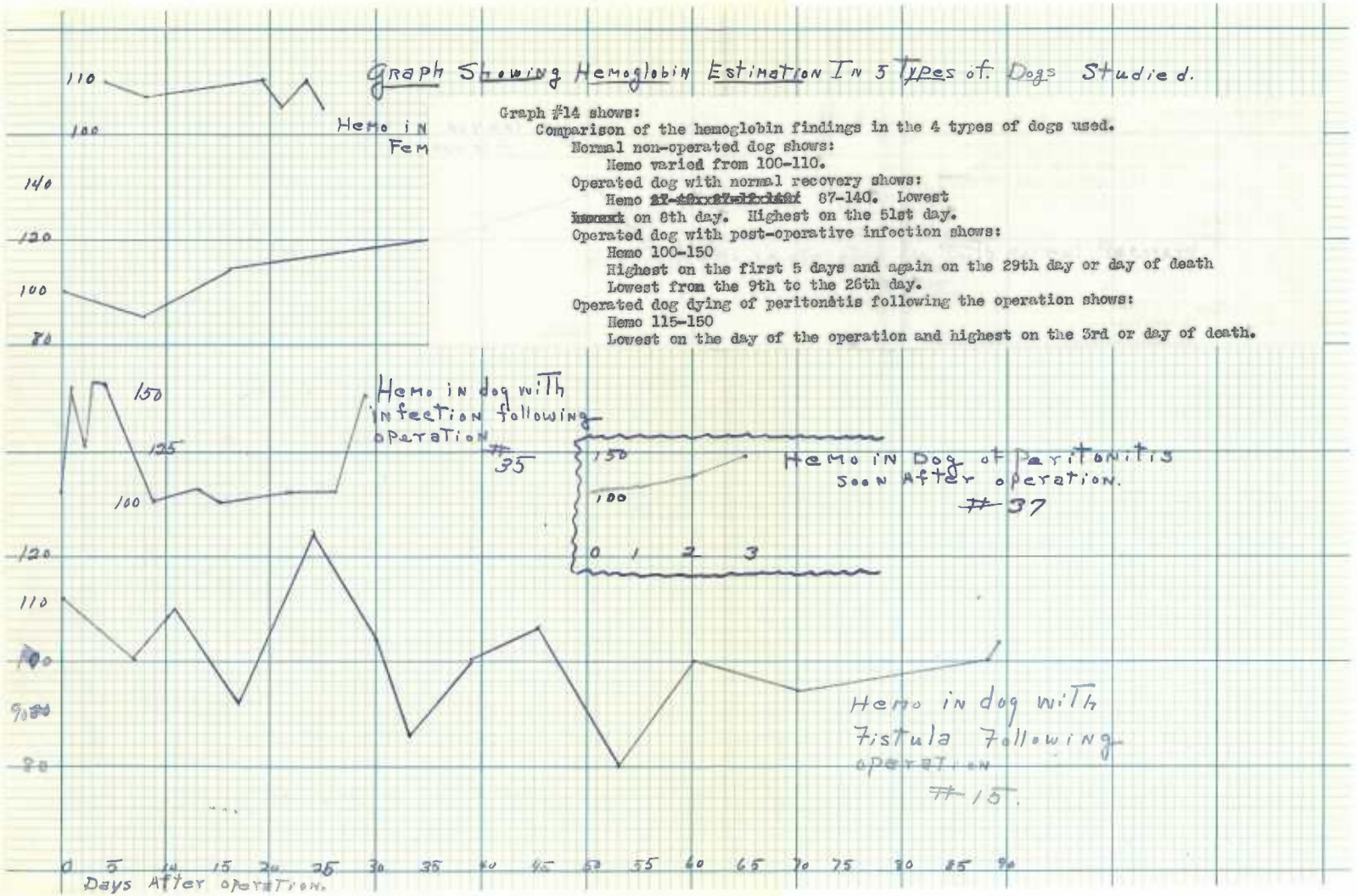


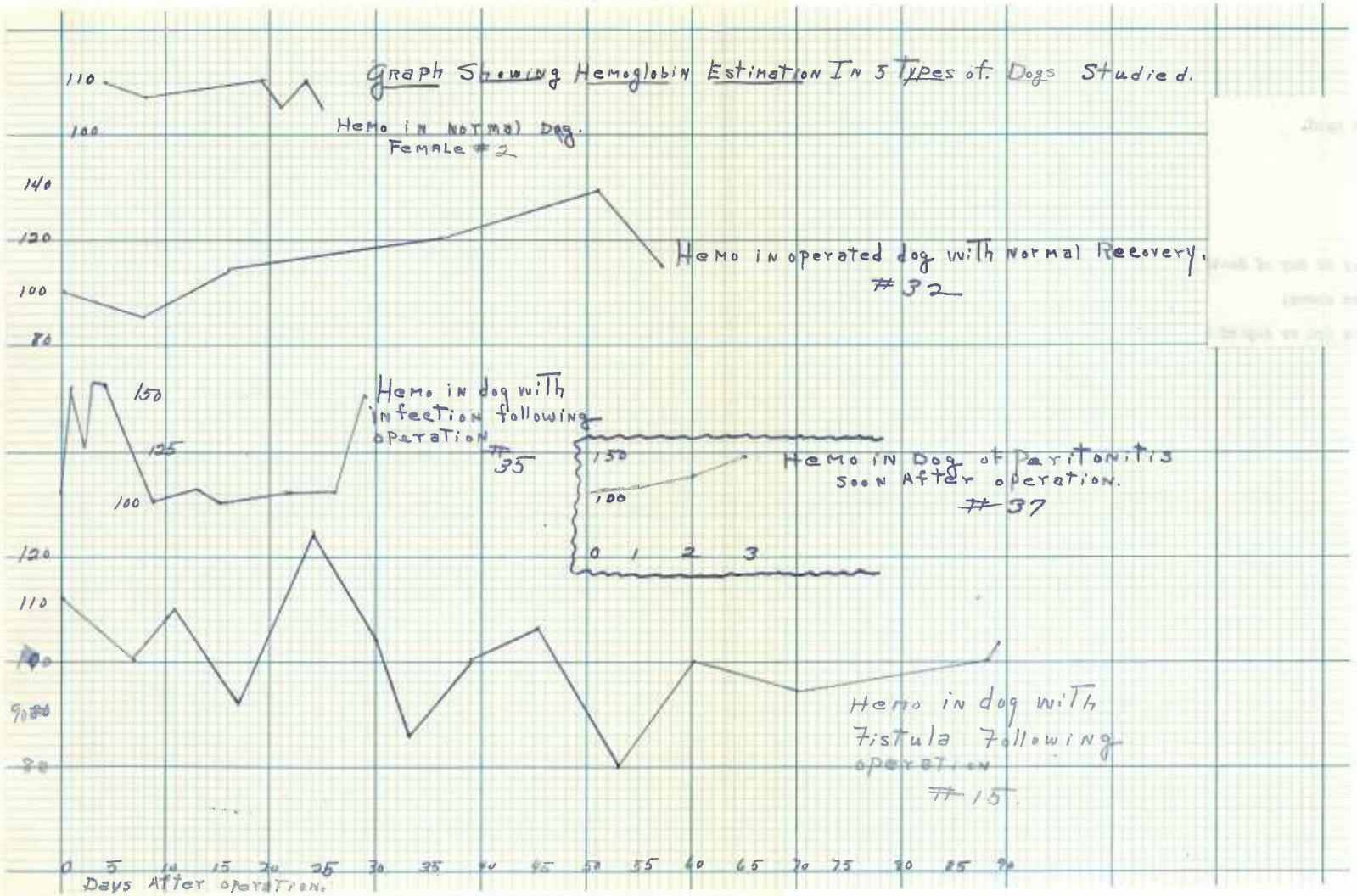
Red Blood Cell Count in 4 Types of Dogs Studied

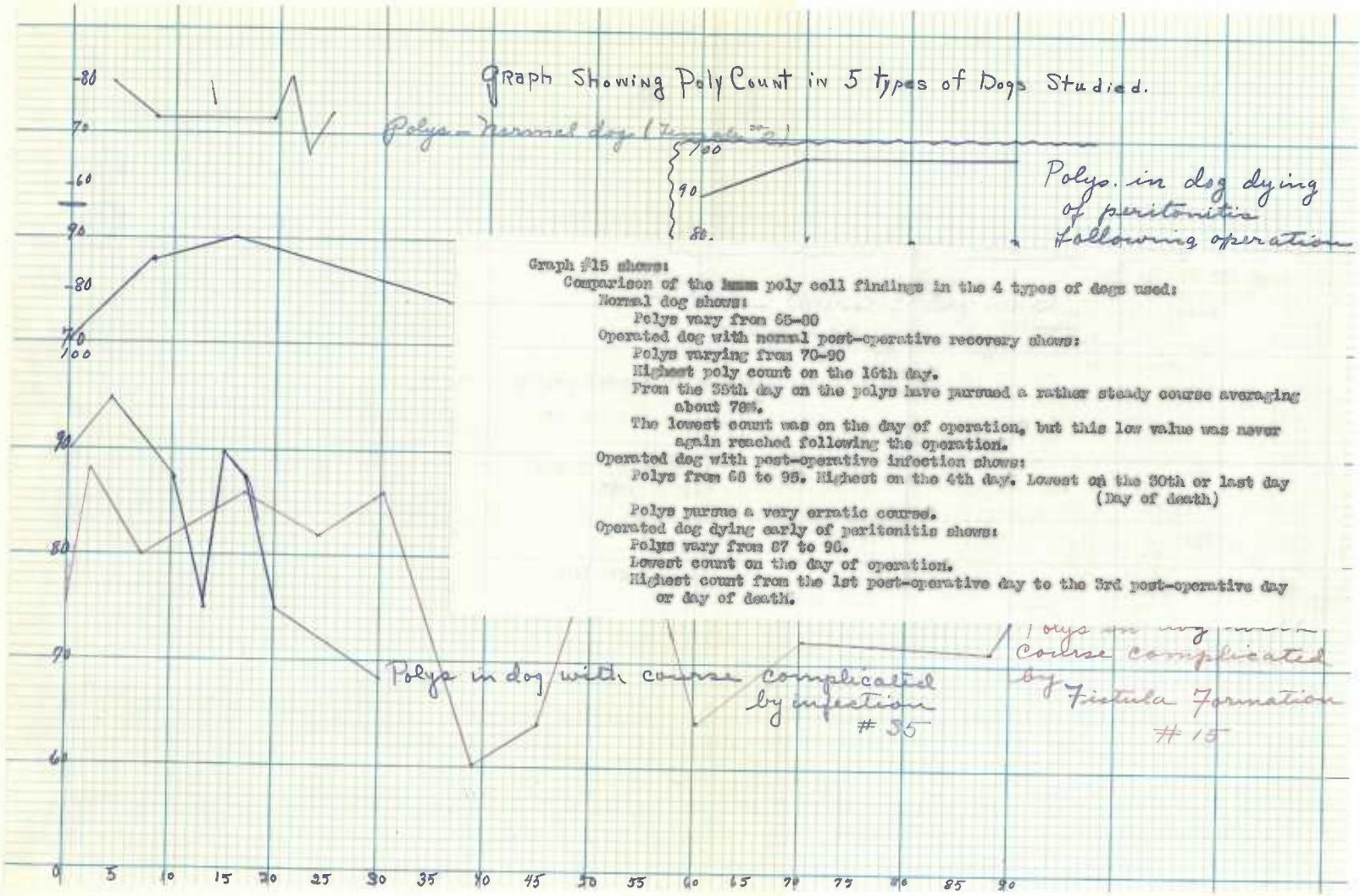


Graph #13 shows:
Comparison of the white cell findings in the 4 types of dogs used.
Normal dog shows day to day variation of 8000 to 12000.
Operated dog with normal recovery shows:
Day to day variation of 10,000 to 40,000.
Highest on the 8th day. Lowest on the 36th day.
Operated dog with post-operative infection shows:
Day to day variation of 4000 to 24,000.
Highest on the 1st day.
Lowest on the day of death.
Operated dog dying of peritonitis shows:
Day to day variation of 10,000 to 30,000.
Highest on the 3rd day or day of death.
Lowest on the 1st day, with gradual rapid climb to 3rd or a fatal day.

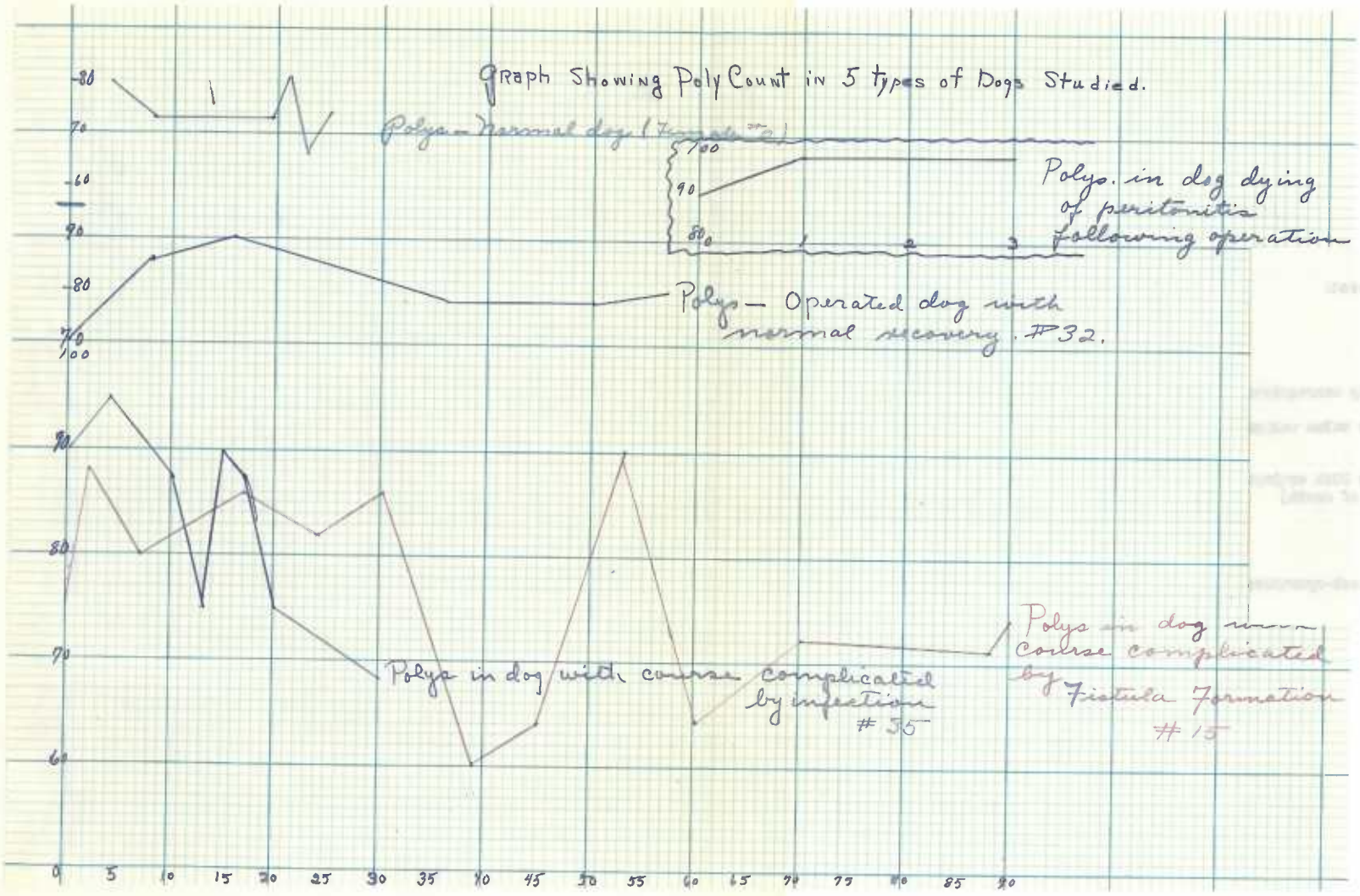

White Blood Cell Counts in Various Types of Dogs Used, Compared.
11,000
10,000
9,000
Normal Dog (Female #2)
40,000
30,000
20,000
10,000
Operated Dog with Normal Recovery (#32)
30,000
20,000
10,000
Operated Dog With Infection Course (#35)
0 5 10 15 20 25 30 35 40 45 50 55 60
Days After Operation
30,000
20,000
10,000
0 1 2 3
In operated dog dying early of peritonitis

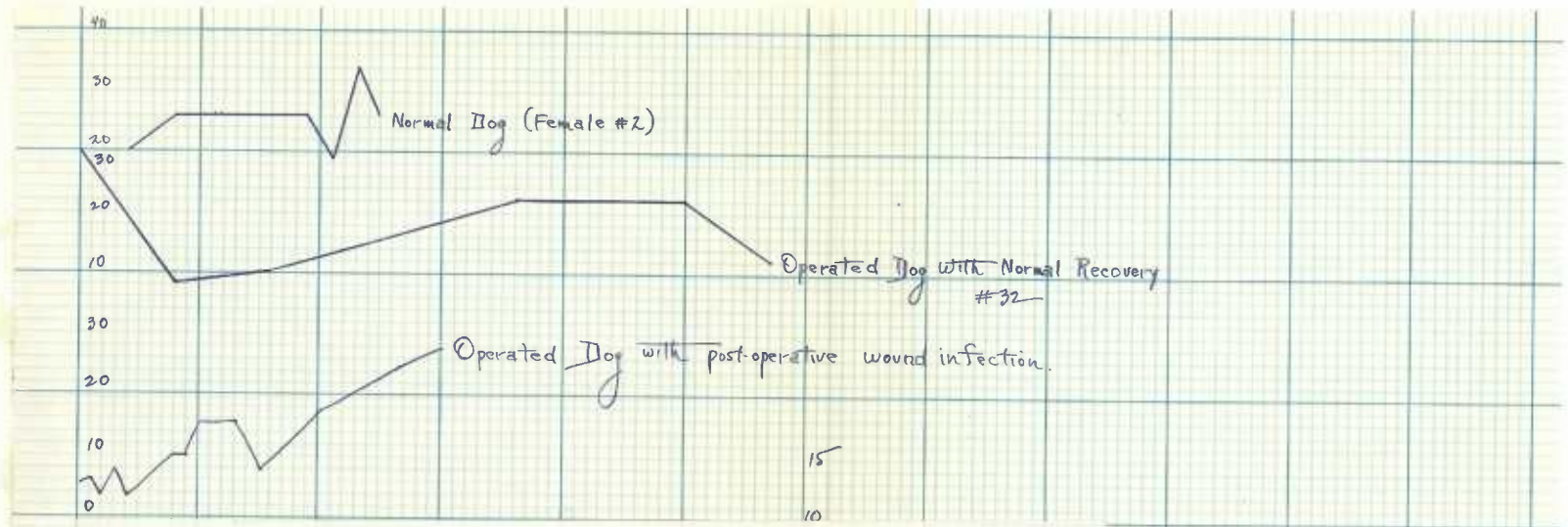

Graph Showing Hemoglobin Estimation In 3 Types of Dogs Studied.
Graph #14 shows:
Comparison of the hemoglobin findings in the 4 types of dogs used.
Normal non-operated dog shows:
Hemo varied from 100-110.
Operated dog with normal recovery shows:
Hemo 87-140. Lowest
on 8th day. Highest on the 51st day.
Operated dog with post-operative infection shows:
Hemo 100-150
Highest on the first 5 days and again on the 29th day or day of death
Lowest from the 9th to the 26th day.
Operated dog dying of peritonitis following the operation shows:
Hemo 115-150
Lowest on the day of the operation and highest on the 3rd or day of death.
Hemo in Fem
Hemo in dog with infection following operation #35
Hemo in Dog of Peritonitis soon After operation. #37
Hemo in dog with fistula following operation #15.
Days After operation.


Graph Showing Hemoglobin Estimation In 3 Types of Dogs Studied.
Hemo in Normal Dog.
Female #2
Hemo in operated dog with Normal Recovery.
#32
Hemo in dog with infection following operation
#35
Hemo in Dog of Peritonitis Soon After operation.
#37
Hemo in dog with fistula following operation
#15.
Days After operation.



Graph #15 shows:
Comparison of the human poly coll findings in the 4 types of dogs used:
Normal dog shows:
Polys vary from 65-80
Operated dog with normal post-operative recovery shows:
Polys varying from 70-90
Highest poly count on the 16th day.
From the 35th day on the polys have pursued a rather steady course averaging about 78%.
The lowest count was on the day of operation, but this low value was never again reached following the operation.
Operated dog with post-operative infection shows:
Polys from 68 to 95. Highest on the 4th day. Lowest on the 30th or last day (Day of death)
Polys pursue a very erratic course.
Operated dog dying early of peritonitis shows:
Polys vary from 87 to 96.
Lowest count on the day of operation.
Highest count from the 1st post-operative day to the 3rd post-operative day or day of death.

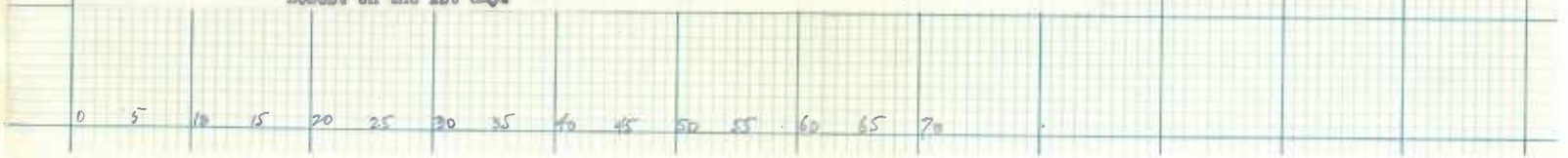

Graph Showing Poly Count in 5 types of Dogs Studied.
Polys. in dog dying of peritonitis following operation
Polys — Operated dog with normal recovery. #32.
Polys in dog with course complicated by infection #35
Polys in dog with course complicated by Fistula Formation #15
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90

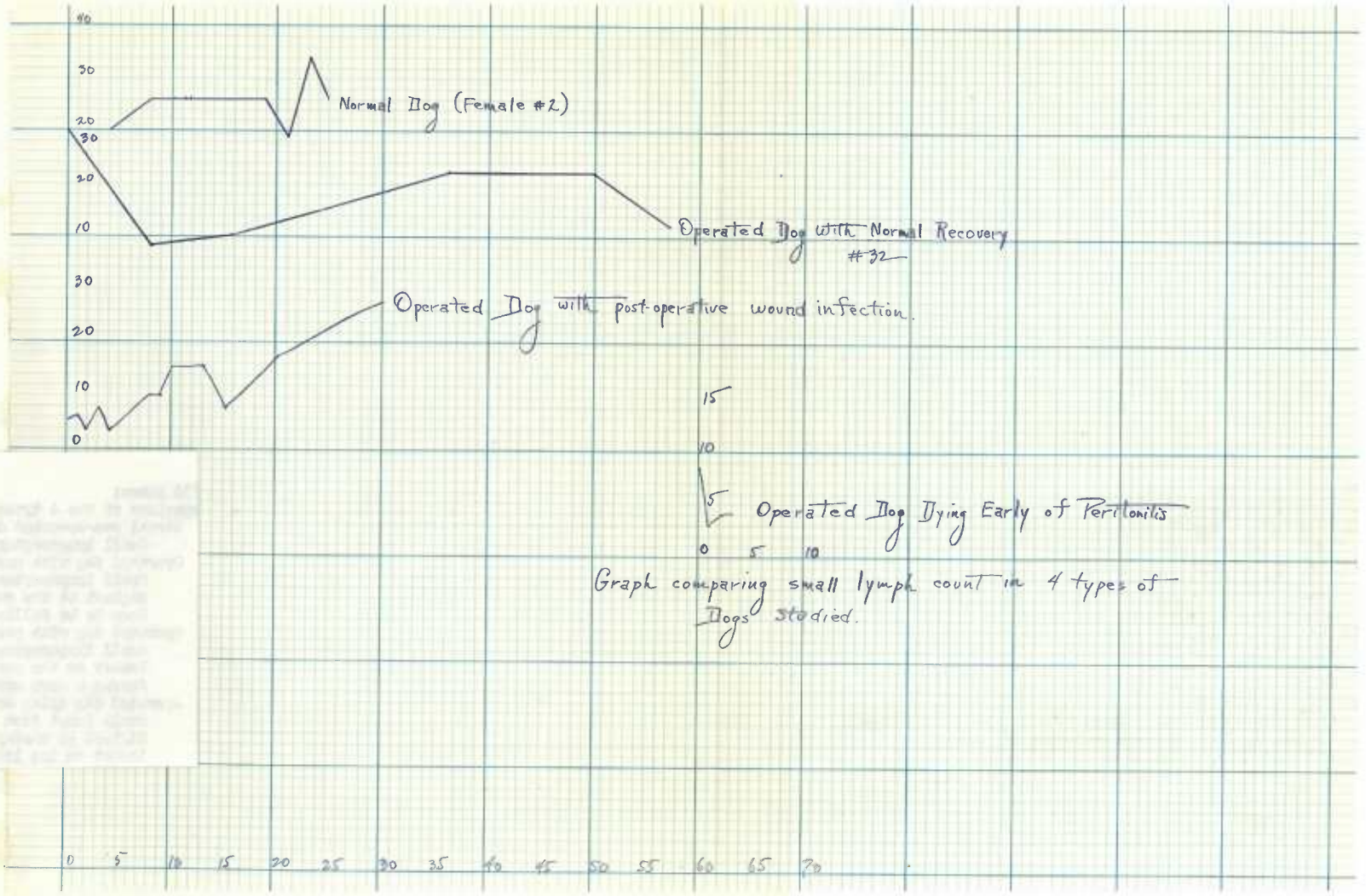


Graph #16 shows:
Comparison of the 4 types of small lymphocyte curves found:
Normal non-operated dogs shows:
Small lymphocytes vary from 19 to 34 percent.
Operated dog with normal recovery shows:
Small lymphocytes from 6 to 30
Highest at the outset, lowest on the 8th 6th day.
Seem to be falling after the 30th day.
Operated dog with post-operative infection shows:
Small lymphocytes from 20 to 28x 4 to 28.
Lowest on the second day. Highest on the 30th day or day of death.
Pursue a very erratic course.
Operated dog dying of peritonitis early following the operation shows:
Small lymph from 5 to 8.
Highest on the day of operation.
Lowest on the 1st day.

Early of Peritonitis

nt in 4 types of





Graph comparing small lymph count in 4 types of Dogs studied.

Operated 2-28-29 Table 11

able showing relationship of pressures and volume of loop contents to blood icture.

ay following operation	Dog 12 Condition.	Date	pres.	Vol.	Reds	Whts.	Hemo.	Polys.	Sm Lymph.	Temp.
2	Fair	3-2	20 cm	13 cc	7.12	14.8	100	93	6	105.5
3	Fine	3-3								102.0
4	Fine	3-4	18 cm	22 cc						101.6
5	Fine	3-5								101.2
6	Fine	3-6	30 cm	45 cc						101.7
7	Fine	3-7								101.0
8	Sick	3-8	Thick	37 cc						102.3
9	Fair	3-9		17 cc	5.30	17.0	94	92	6	100
10	Fine	3-10								100.5
11	Fine	3-11		17 cc						100.4
12	Fine	3-12								100.6
13	Fine	3-13			5.45	16.1	95			102.0
14	Fair	3-14		25 cc						101.7
15	Fine	3-15								100.4
16	Fine	3-16		0						101.9
17	Fine	3-17								101.2
18	Good	3-18	28 cm	10cc						101.7
19	Fine	3-19								102.2
20	Poor	3-20	22 cm	44 cc						101.2
21	Fine	3-21								101.2
22	Fine	3-22								101.0
23	Fine	3-23	20 cm	65 cc	4.83	25.0	88	87	13	101.7
24	Good	3-24								101.0
25	Fine	3-25		95 cc						103.0
26	Fine	3-26	23 cm 40 cc	95 cc						100.0
27	Fine	3-27		25cc						100.6
28	Fine	3-28		17 cc	5.17	21.2	92	73	26	100.2

Day Following operation	Dog 12 Condition	Date	Pres.	Vol.	Red	Whts.	Hemo.	Polys.	Sm. Lymph.	Temp.
29	Fine	3-29		15cc						100.4
30	Fine	3-30								101.2
31	Fine	3-31								100.2
32	Fine	4-1		25cc						101.4
33	Fine	4-2								102
34	Poor	4-3		32cc						101.8
35	Fine	4-4			5.73	19.3	95	81	15	102.6
36	Good	4-5		14cc						101.5
37	Fine	4-6								100.6
38	Fine	4-7			5.36	14.4	95	76	20	100.9
39	Fine	4-8	22cm	30cc						101.0
40	Good	4-9								101.0
41	Fine	4-10		45cc	5.31	14.7	98	49	46	102
42	Fine	4-11								100.5
43	Fine	4-12	25cm	20cc						100.6
44	Fine	4-13								101.2
45	Fine	4-14								101.7
46	Fine	4-15								101.2
47	Fine	4-16								100.4
48	Fine	4-17								101.0
49 F	Fine	4-18								100.4
50	Fine	4-19		30cc						100.8
51	Fine	4-20								100.6
52	Fine	4-21								101.2
53	Fine	4-22		10cc						100.8
54	Fine	4-23								101.0
55	Fine	4-24								100.6
56	Poor	4-25	55cm	27cc	6.32	5.2	120	68	28	102.0
57	Fine	4-26								101.8

Day Following operation	Dog 12 Condition.	Date	Pres.	Vol.	Red	Whte.	Hemo.	Polys.	Sm.Lymph.	Temp.
58	Fine	4-27								101.6
59	Fine	4-28								101.4
60	Fine	4-29		45cc						100.0
61	Fine	4-30								100.4
62	Poor	5-1								101.0
63	Fair	5-2		50cc	5.12	11.6	100	61	31	102.6
64	Fine	5-3								101.0
65	F air	5-4		10cc	5.27	10.0	98	73	25	100.4
66	Fine	5-5								100.6
67	Fine	5-6			6.46	18.1	100	80	20	100.2
68	Fine	5-7		15cc						100.6
69	Fine	5-8								101.2
70	Fine	5-9		10cc	5.59	16.9	107	79	17	101.6
71	Fine	5-10								101.2
72	Fine	5-11								100.2
73	Fine	5-12								100.4
74	Fine	5-13								100.0
75	Fine	5-14		4cc						100.6
76	Fine	5-15								100.4
77	Fine	5-16								101.4
78	Fine	5-17								101.2
79	Fine	5-18								101.0
80	Fine	5-19		0						101.4
81	Fine	5-20								100.4
82	Fine	5-21								100.2
83	Fine	5-22		0						100.8
84	Fine	5-23			6.06	11.4	100	60	36	100.0
85	Fine	5-24								100.0
86	Fine	5-25								99.0

Day Following operation	Dog 12 Condition	Date	Pres.	Vol.	Red	Whts.	Hemo.	Polys.	Sm. Lymph.	Temp.
87	Fine	5-26								100.0
88	Fine	5-27								100.0
89	Fine	5-28								100.4
90	Fine	5-29								101.0
91	Fine	5-30			6.30	37.7	104	90	9	102.0
92	Fine	5-31								100.4
93	Fine	6-1								99.4
94	Fine	6-2								100.5
95	Fine	6-3								101.0
96	Fine	6-4								100.4
97	Fine	6-5								100.0
98	Fine	6-6								100.0
99	Fine	6-7								100.0
100	Fine	6-8								100.2
101	Fine	6-9			6.68	17.5	110	94	6	100.0
102	Fair	6-10								102.0
103	Fine	6-11	52cm	90cc	7.24	14.6	105	91	5	102.8
104	Fine	6-12			6.25	15.5	105	84	16	100.4
105	Fine	6-13	32cm	65cc						102.4
106	Fine	6-14	40cm	65cc	6.37	8.5	103	62	21	103.2
107	Fine	6-15		45cc						100.8
108	Fine	6-16		25cc						100.1
109	Fine	6-17								101.4
110	Fine	6-18		7 cc						100.2
111	Fine	6-19								100.4
112	Fine	6-20								101.0
113	Fine	6-21								100.4
114	Fine	6-22								100.2
115	Fine	6-23								100.8

Day Following operation	Dog 12 Condition	Date	Pres.	Vol.	Red	Whts.	Hemo.	Polys.	Sm. Lymph.	Temp.
116	Fine	6-24								99.8
117	Fine	6-25								100.2
118	Fine	6-26			6.48	13.4	100	84	15	100.0
119	Fine	6-27								100.2
120	Fine	6-28								99.6
121	Fine	6-29								98.9
122	Fine	6-30								99.6
123	Fine	7-1								99.8
124	Fine	7-2			7.40	16.5	110	74	24	100.0
125	Fine	7-3	Last Blood count was done on the 7-2 on this dog.							

Operated 2-28-29 Table 11

able showing relationship of pressures and volume of loop contents to blood icture.

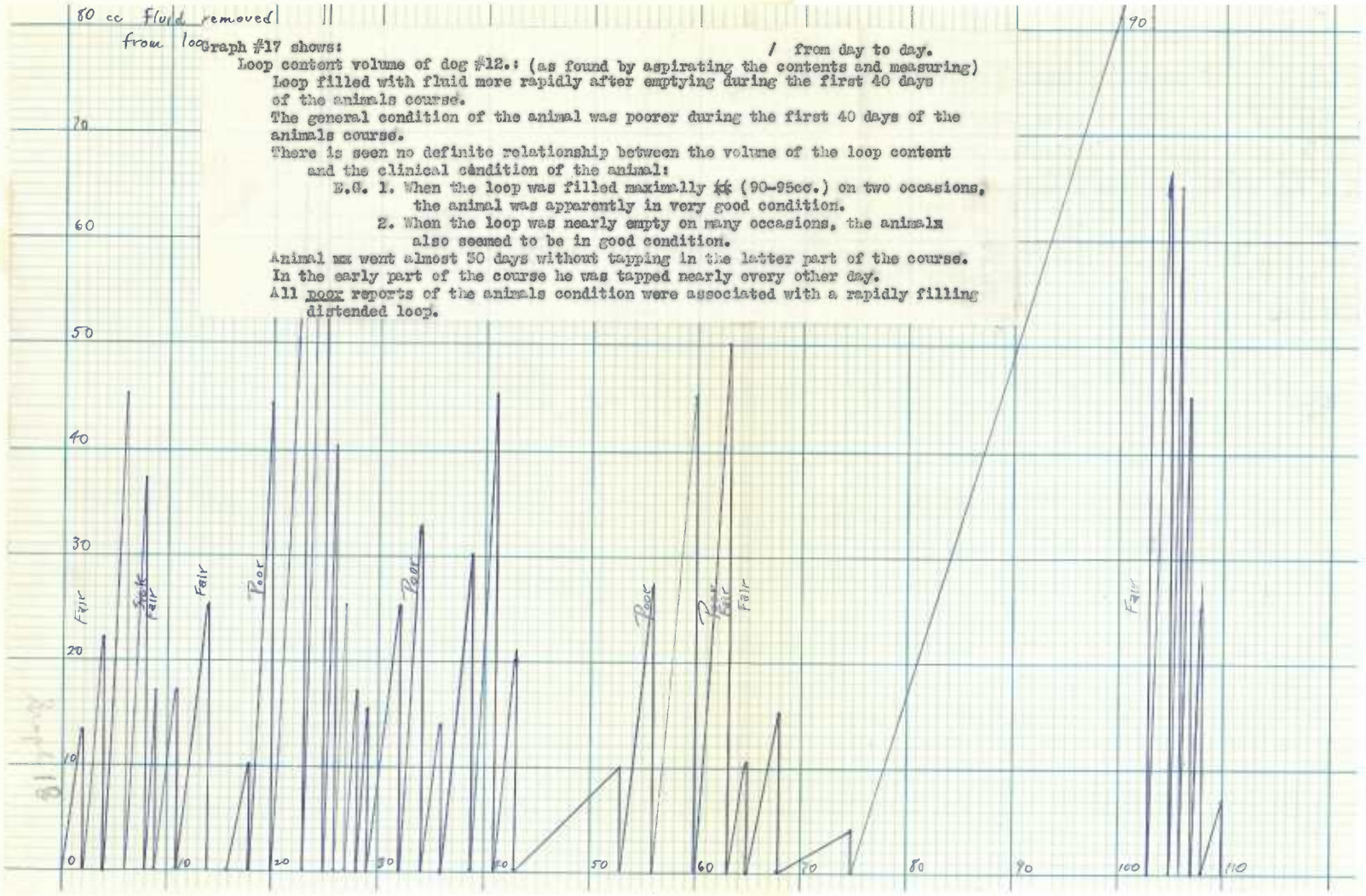
ay following operation	Dog 12 Condition.	Date	pres.	Vol.	Reds	Whts.	Hemo.	Polys.	Sm Lymph.	Temp.
2	Fair	3-2	20 cm	13 cc	7.12	14.8	100	93	6	105.5
3	Fine	3-3								102.0
4	Fine	3-4	18 cm	22 cc						101.6
5	Fine	3-5								101.2
6	Fine	3-6	30 cm	45 cc						101.7
7	Fine	3-7								101.0
8	Sick	3-8	Thick	37 cc						102.3
9	Fair	3-9		17 cc	5.30	17.0	94	92	6	100
10	Fine	3-10								100.5
11	Fine	3-11		17 cc						100.4
12	Fine	3-12								100.6
13	Fine	3-13			5.45	16.1	95			102.0
14	Fair	3-14		25 cc						101.7
15	Fine	3-15								100.4
16	Fine	3-16		0						101.9
17	Fine	3-17								101.2
18	Good	3-18	28 cm	10cc						101.7
19	Fine	3-19								102.2
20	Poor	3-20	22 cm	44 cc						101.2
21	Fine	3-21								101.2
22	Fine	3-22								101.0
23	Fine	3-23	20 cm	65 cc	4.83	25.0	88	87	13	101.7
24	Good	3-24								101.0
25	Fine	3-25		95 cc						103.0
26	Fine	3-26	23 cm 40 cc	95 cc						100.0
27	Fine	3-27		25cc						100.6
28	Fine	3-28		17 cc	5.17	21.2	92	73	26	100.2

Day Following operation	Dog 12 Condition	Date	Pres.	Vol.	Red	Whts.	Hemo.	Polys.	Sm. Lymph.	Temp.
29	Fine	3-29		15cc						100.4
30	Fine	3-30								101.2
31	Fine	3-31								100.2
32	Fine	4-1		25cc						101.4
33	Fine	4-2								102
34	Poor	4-3		32cc						101.8
35	Fine	4-4			5.73	19.3	95	81	15	102.6
36	Good	4-5		14cc						101.5
37	Fine	4-6								100.6
38	Fine	4-7			5.36	14.4	95	76	20	100.9
39	Fine	4-8	22cm	30cc						101.0
40	Good	4-9								101.0
41	Fine	4-10		45cc	5.31	14.7	98	49	46	102
42	Fine	4-11								100.5
43	Fine	4-12	25cm	20cc						100.6
44	Fine	4-13								101.2
45	Fine	4-14								101.7
46	Fine	4-15								101.2
47	Fine	4-16								100.4
48	Fine	4-17								101.0
49 F	Fine	4-18								100.4
50	Fine	4-19		30cc						100.8
51	Fine	4-20								100.6
52	Fine	4-21								101.2
53	Fine	4-22		10cc						100.8
54	Fine	4-23								101.9
55	Fine	4-24								100.6
56	Poor	4-25	55cm	27cc	6.32	5.2	120	68	28	102.0
57	Fine	4-26								101.8

Day Following operation	Dog 12 Condition.	Date	Pres.	Vol.	Red	Whts.	Hemo.	Polys.	Sm. Lymph.	Temp.
58	Fine	4-27								101.6
59	Fine	4-28								101.4
60	Fine	4-29		45cc						100.0
61	Fine	4-30								100.4
62	Poor	5-1								101.0
63	Fair	5-2		50cc	5.12	11.6	100	61	31	102.6
64	Fine	5-3								101.0
65	F air	5-4		10cc	5.27	10.0	98	73	25	100.4
66	Fine	5-5								100.6
67	Fine	5-6			6.46	18.1	100	80	20	100.2
68	Fine	5-7		15cc						100.6
69	Fine	5-8								101.2
70	Fine	5-9		10cc	5.59	16.9	107	79	17	101.6
71	Fine	5-10								101.2
72	Fine	5-11								100.2
73	Fine	5-12								100.4
74	Fine	5-13								100.0
75	Fine	5-14		4cc						100.6
76	Fine	5-15								100.4
77	Fine	5-16								101.4
78	Fine	5-17								101.2
79	Fine	5-18								101.0
80	Fine	5-19		0						101.4
81	Fine	5-20								100.4
82	Fine	5-21								100.2
83	Fine	5-22		0						100.8
84	Fine	5-23			6.06	11.4	100	60	36	100.0
85	Fine	5-24								100.0
86	Fine	5-25								99.0

Day Following operation	Dog 12 Condition	Date	Pres.	Vol.	Red	Whts.	Hemo.	Polys.	Sm. Lymph.	Temp.
87	Fine	5-26								100.0
88	Fine	5-27								100.0
89	Fine	5-28								100.4
90	Fine	5-29								101.0
91	Fine	5-30			6.30	37.7	104	90	9	102.0
92	Fine	5-31								100.4
93	Fine	6-1								99.4
94	Fine	6-2								100.5
95	Fine	6-3								101.0
96	Fine	6-4								100.4
97	Fine	6-5								100.0
98	Fine	6-6								100.0
99	Fine	6-7								100.0
100	Fine	6-8								100.2
101	Fine	6-9			6.68	17.5	110	94	6	100.0
102	Fair	6-10								102.0
103	Fine	6-11	52cm	90cc	7.24	14.6	105	91	5	102.8
104	Fine	6-12			6.25	15.5	105	84	16	100.4
105	Fine	6-13	32cm	65cc						102.4
106	Fine	6-14	40cm	65cc	6.37	8.5	103	62	21	103.2
107	Fine	6-15		45cc						100.8
108	Fine	6-16		25cc						100.1
109	Fine	6-17								101.4
110	Fine	6-18		7 cc						100.2
111	Fine	6-19								100.4
112	Fine	6-20								101.0
113	Fine	6-21								100.4
114	Fine	6-22								100.2
115	Fine	6-23								100.8

Day Following operation	Dog 12 Condition	Date	Pres. Vol.	Red	Whts.	Hemo.	Polys.	Sm. Lymph.	Temp.
116	Fine	6-24							99.8
117	Fine	6-25							100.2
118	Fine	6-26		6.48	13.4	100	84	15	100.0
119	Fine	6-27							100.2
120	Fine	6-28							99.6
121	Fine	6-29							98.9
122	Fine	6-30							99.6
123	Fine	7-1							99.8
124	Fine	7-2		7.40	16.5	110	74	24	100.0
125	Fine	7-3	Last Blood count was done on the 7-2 on this dog.						



Graph #17 shows: / from day to day.

Loop content volume of dog #12.: (as found by aspirating the contents and measuring)

Loop filled with fluid more rapidly after emptying during the first 40 days of the animals course.

The general condition of the animal was poorer during the first 40 days of the animals course.

There is seen no definite relationship between the volume of the loop content and the clinical condition of the animal:

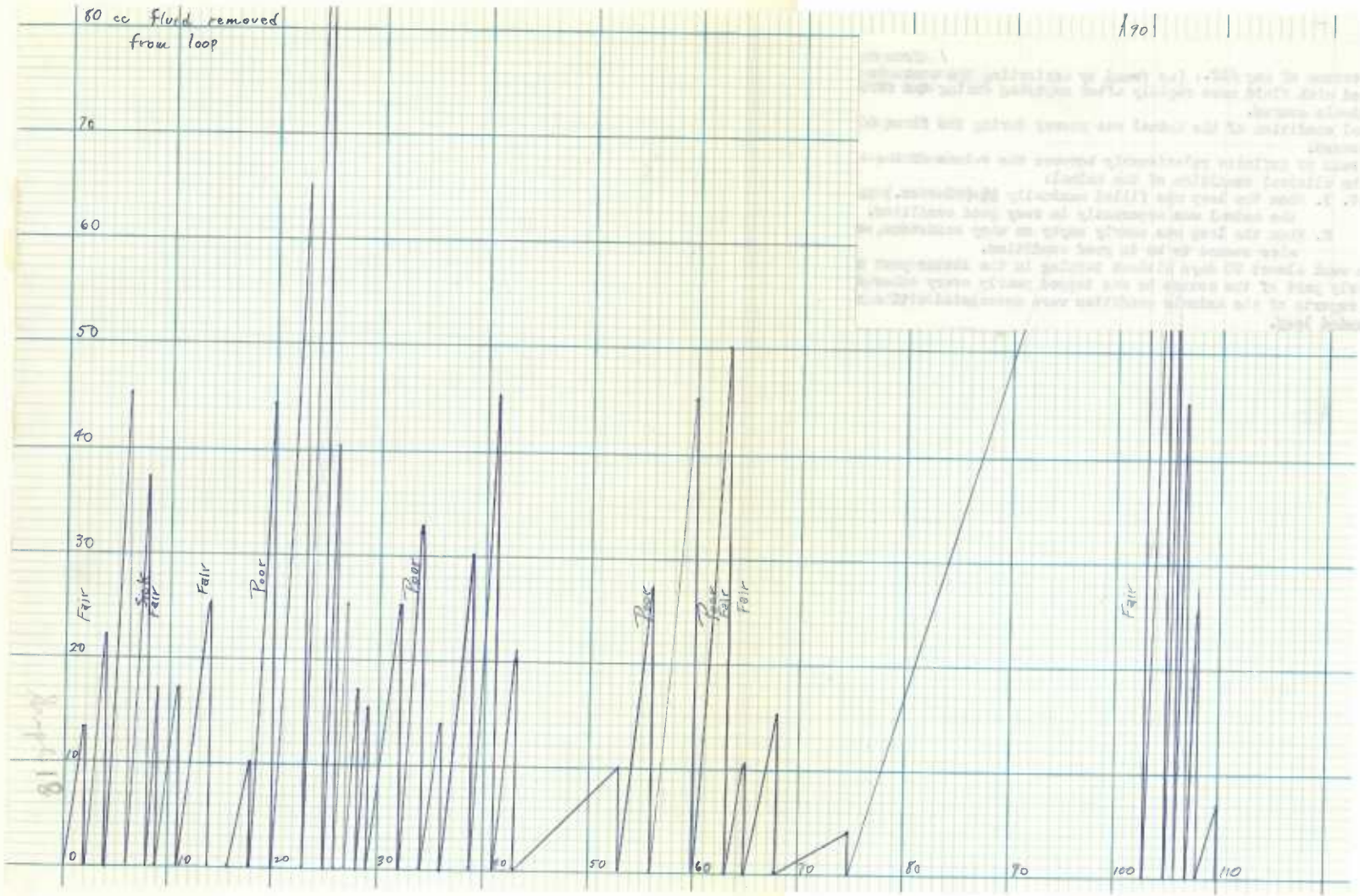
B.C. 1. When the loop was filled maximally ~~xx~~ (90-95cc.) on two occasions, the animal was apparently in very good condition.

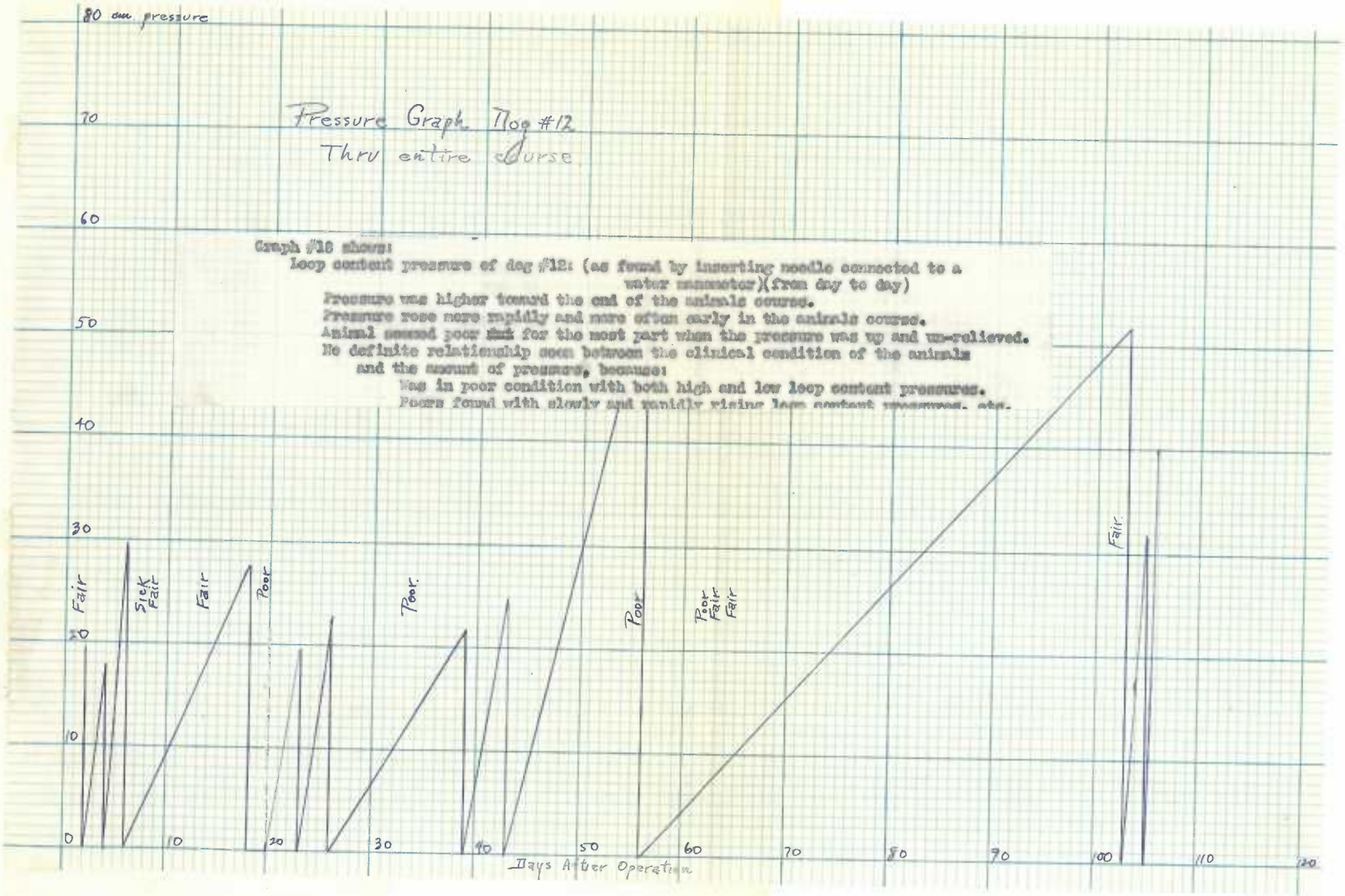
2. When the loop was nearly empty on many occasions, the animals also seemed to be in good condition.

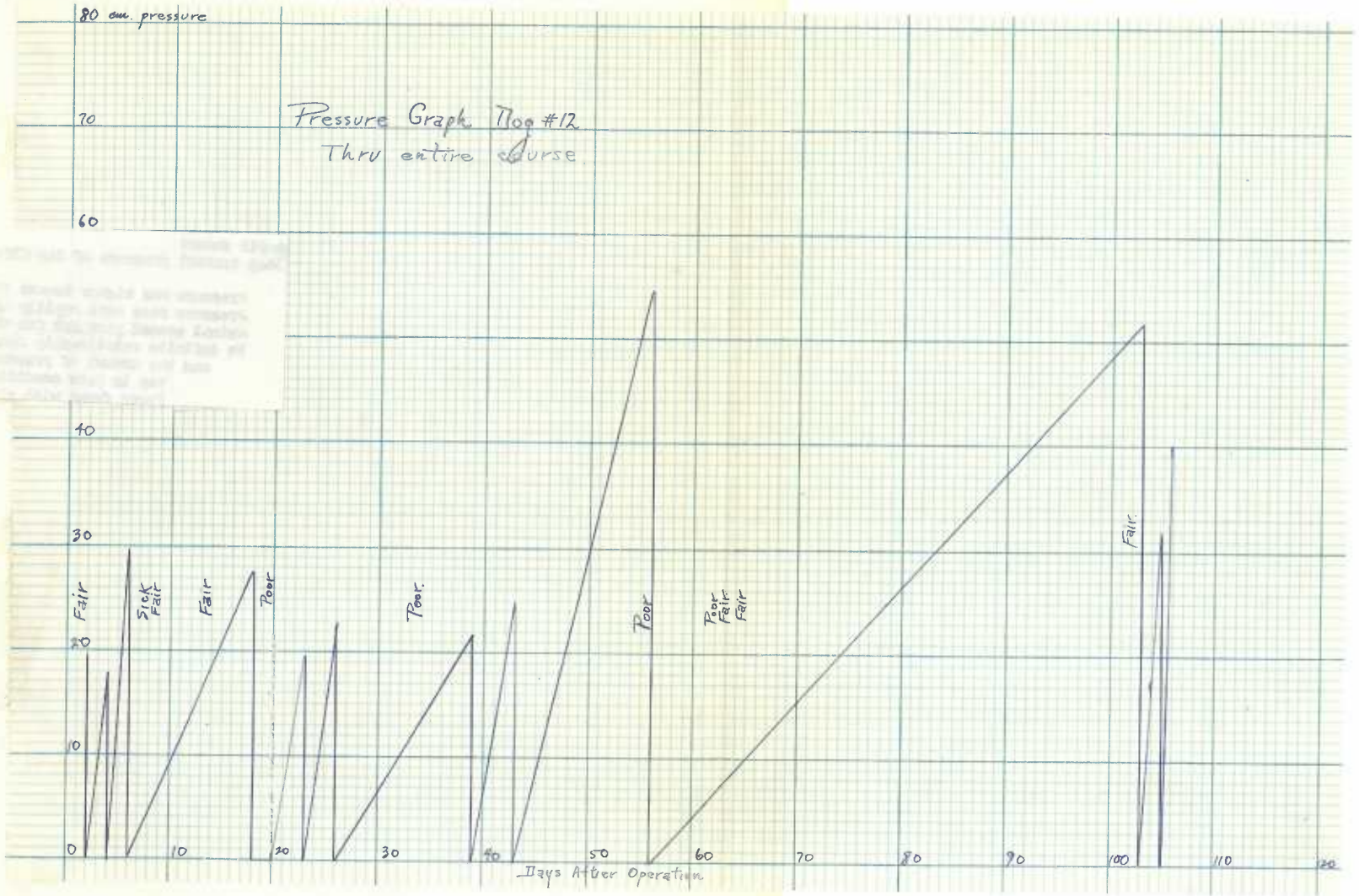
Animal ~~xx~~ went almost 30 days without tapping in the latter part of the course.

In the early part of the course he was tapped nearly every other day.

All poor reports of the animals condition were associated with a rapidly filling distended loop.


80 cc Fluid removed from loop
70
60
50
40
30
20
10
0
Fair
Fair
Fair
Poor
Poor
Poor
Poor
Fair
Fair
10
20
30
40
50
60
70
80
90
100
110


80 cm pressure
70
60
50
40
30
20
10
0
Pressure Graph. Dog #12
Thru entire course
Graph #18 shows:
Loop content pressure of dog #12: (as found by inserting needle connected to a water manometer)(from day to day)
Pressure was higher toward the end of the animals course.
Pressure rose more rapidly and more often early in the animals course.
Animal seemed poor sick for the most part when the pressure was up and un-relieved.
No definite relationship seen between the clinical condition of the animals and the amount of pressure, because:
Was in poor condition with both high and low loop content pressures.
Found with slowly and rapidly rising loop content pressures, etc.
Fair
Sick Fair
Fair
Poor
Poor
Poor
Poor Fair Fair
Fair
10
20
30
40
50
60
70
80
90
100
110
120
Days After Operation



Pressure Graph. Dog #12
Thru entire course

Table 9.

Comparison of loop content volume graph to blood picture graph of dog #12.
(compare graphs 17,19, and 20)

Comparison to red cell curve shows:
Red cell count more steady and slightly on the increase toward the end of the course when the loop content volume was large and slowly filling and aspirated so seldom.
Red count seemed to increase when the aspiration was nor necessary.
Red count dropped when the the frequent aspiration was performed.
Animal was in good condition when the red cells were on the increase.
Nearly always registered fair, poor, or sick when there was a drop in red cells.

Comparison to the white cell curve shows:
Two highest levels of the white count were found corresponding to the two highest loop volumes found.
Two lowest white count levels were found corresponding to the two lowest loop volumes recorded.
White counts seemed to increase when the loop content volumes would increase.

Comparison to hemo curveshows:
No definite relationship.

Comparison to the poly curve shows:
High polys when high loop content volume., and vice versa.
Tapping often caused a drop in polys.
When the tapping was neglected the polys gradually rose.
Maximum loop volume associated with a maximum poly count.
Low poly counts nearly always associated with an inactive or empty loop.

Comparison to small lymphocyte curve shows:
Small lymph were low when the loop volume was high, and vice versa.
Varied inversely as the polys and the comparative findings were the reverse of those of the polys.

Comparison to the temperature curve shows:
Temperatures were definitely about normal when the loop volume was low.
Increase in loop volume always associated with an increase of one or two degrees in temperature. After in tapping the temperature would always promptly fall back to around normal. Temperature would climb as loop content volume increased.

Comparison of loop content pressure graph to blood picture graph of dog #12.
(compare graphs ## 18, 19, and 20)

Comparison to red cell curve shows:
Relief of loop pressure ~~must~~ nearly always followed by a drop in red cell count.
Highest ~~long~~ red cell counts associated with high loop pressures.
Of these the highest are with a slowly filling loop with a slowly ~~rising~~ rising high pressure.

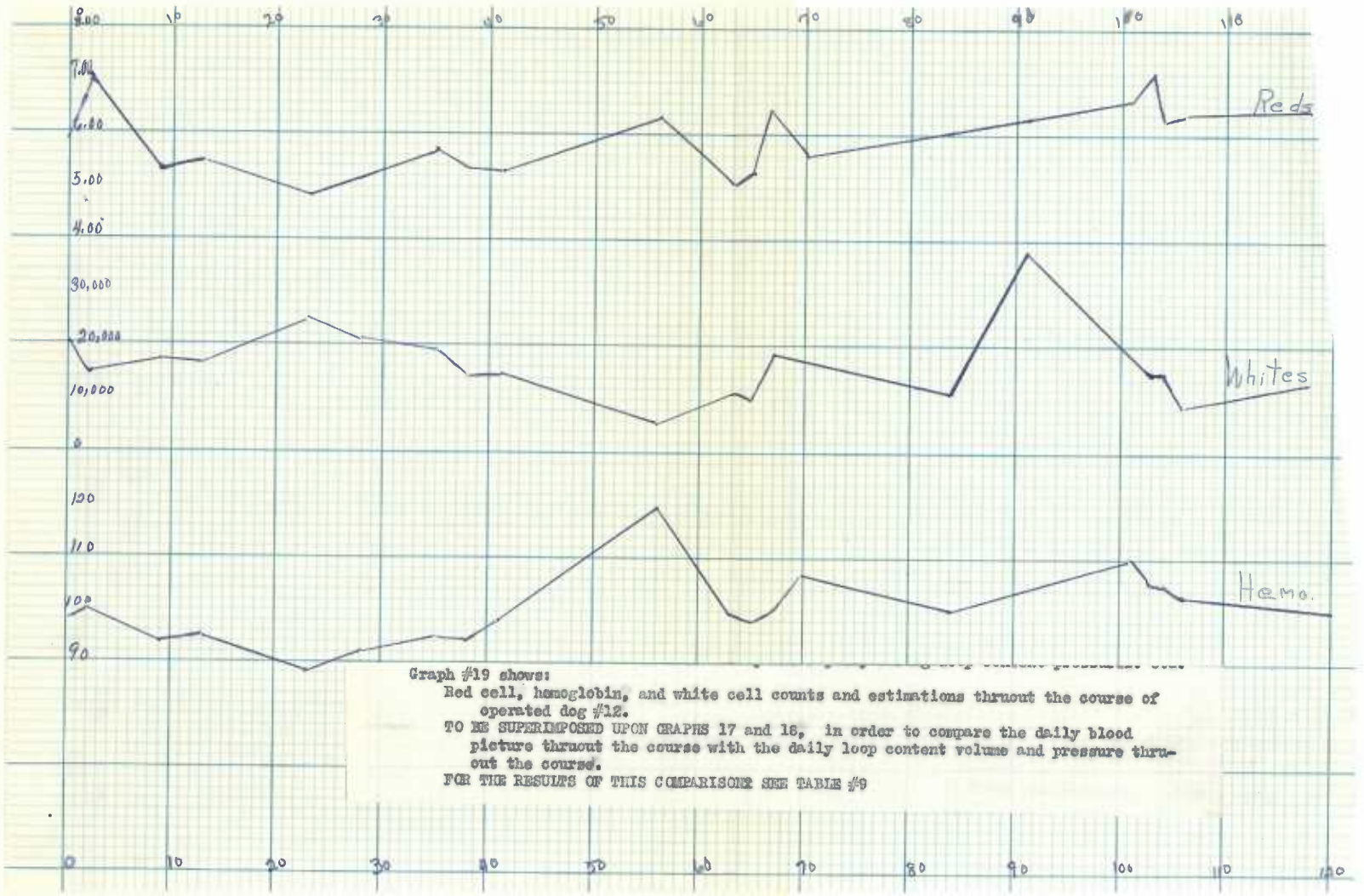
Comparison to white cell curve shows:
High pressures associated with low white counts.
Low white counts usually associated with pressures over 30 cm.

Comparison to hemo curve shows:
Pressures over 30 nearly always associated with high hemo values.
Reduction of pressure by tapping ~~must~~ nearly always followed by a sudden fall in hemo.
Low hemos in general correspond to low pressures.

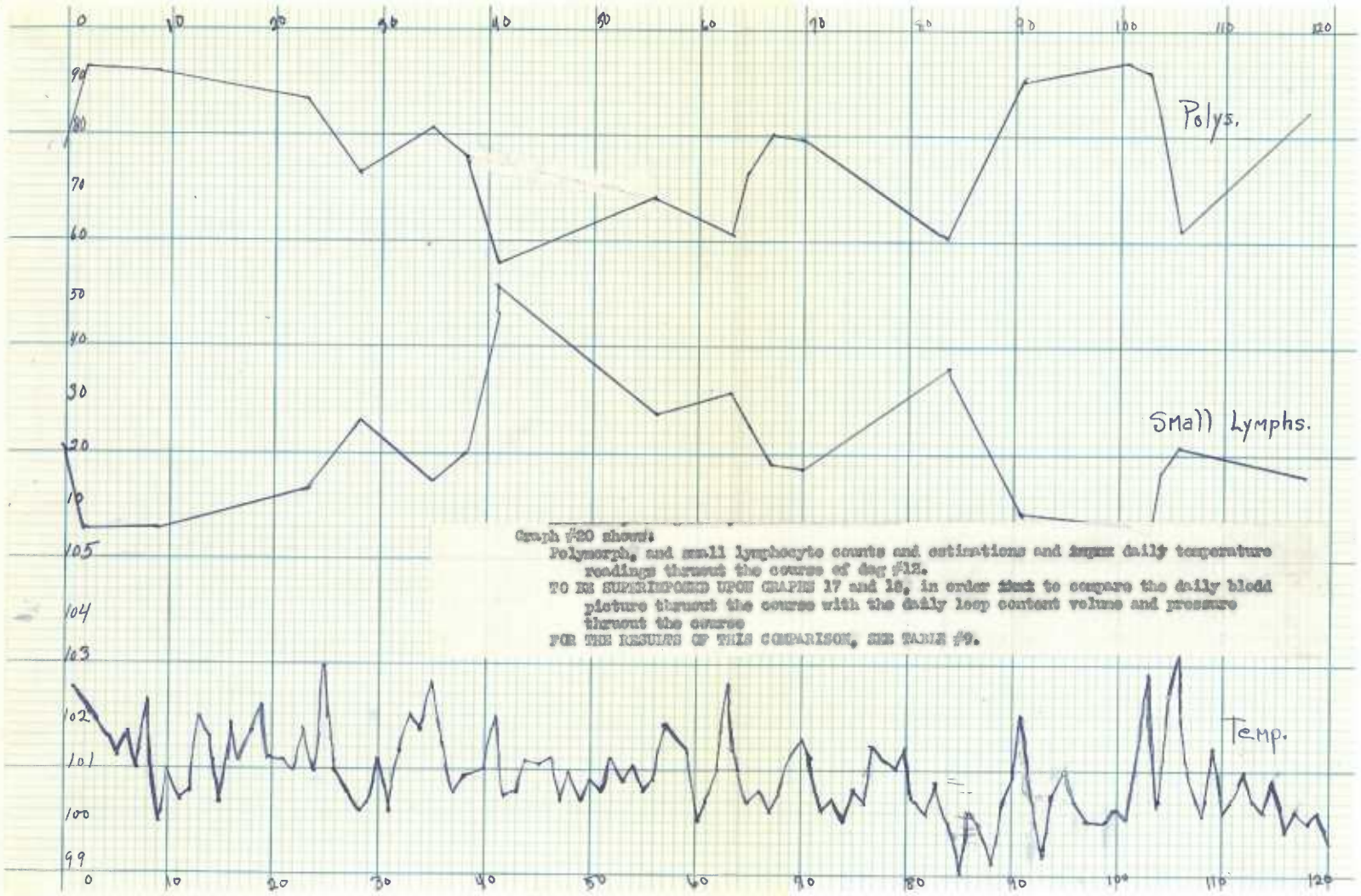
Comparison to poly curve shows:
No definite relationship is seen, altho there seems to be a slight tendency toward a higher polys count with a higher pressure. Relief of pressure often followed by a drop in poly count, in most cases.

Comparison to small lymphocyte curve shows:
No definite relationship seen, altho there seems to be a lower count with high loop pressures, and a higher count with low loop pressures.

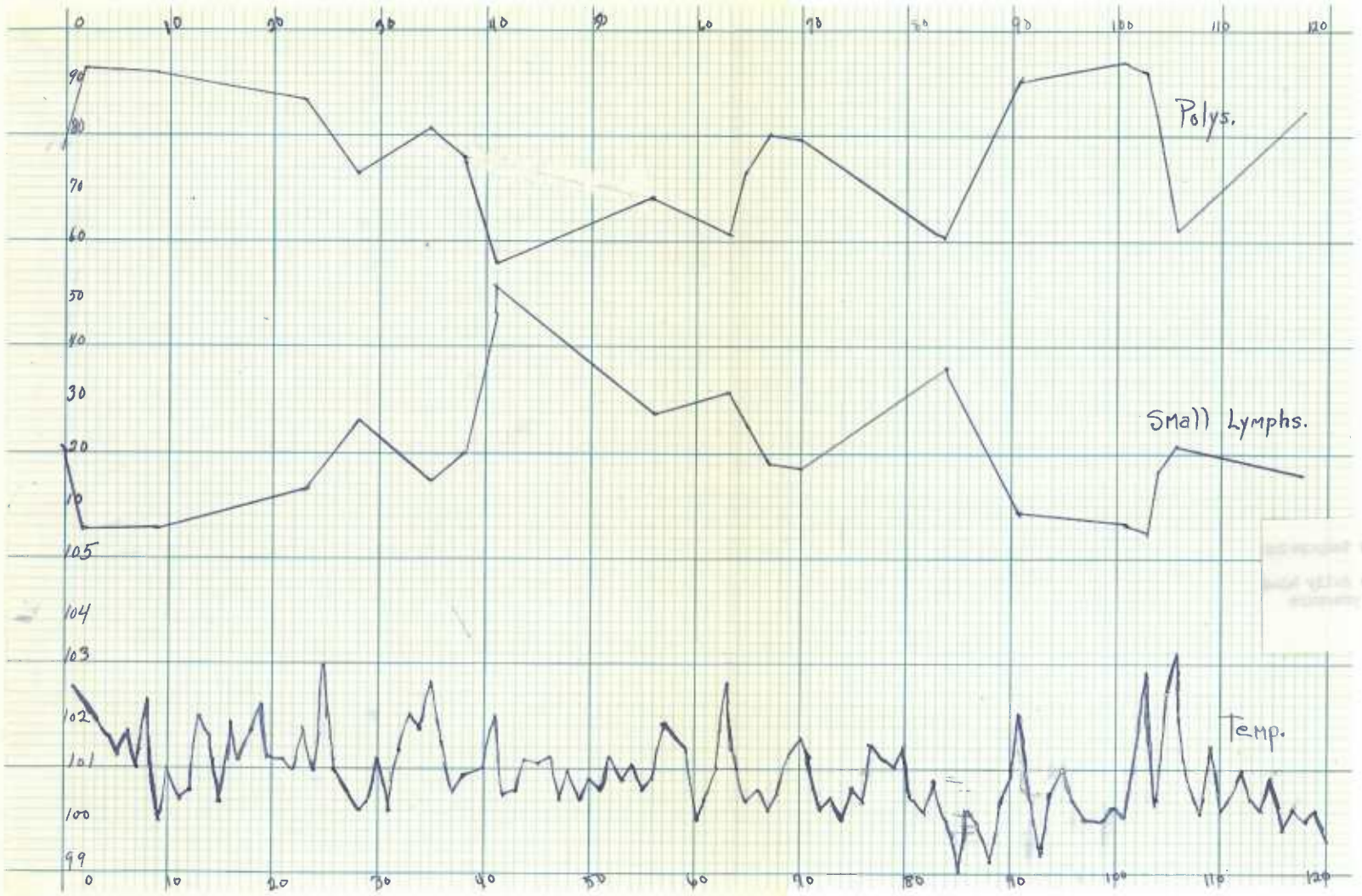
Comparison to temperature curve shows:
No definite relationship.

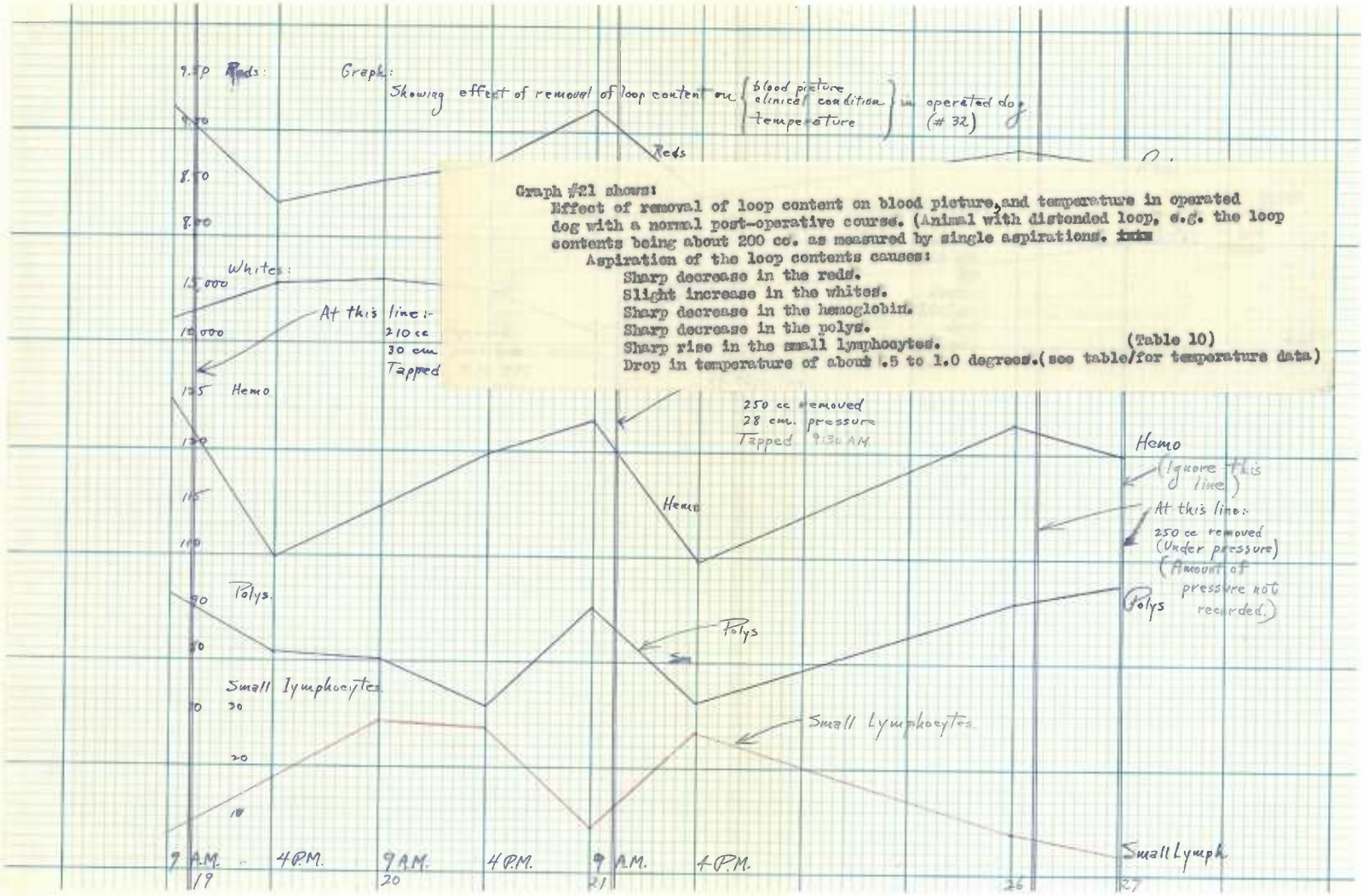


Graph #19 shows:
Red cell, hemoglobin, and white cell counts and estimations thruout the course of operated dog #12.
TO BE SUPERIMPOSED UPON GRAPHS 17 and 18, in order to compare the daily blood picture thruout the course with the daily loop content volume and pressure thruout the course.
FOR THE RESULTS OF THIS COMPARISON SEE TABLE #9



Graph #20 shows:
Polymorph, and small lymphocyte counts and estimations and mean daily temperature readings thruout the course of dog #12.
TO BE SUPERIMPOSED UPON GRAPHS 17 and 18, in order that to compare the daily blood picture thruout the course with the daily loop content volume and pressure thruout the course
FOR THE RESULTS OF THIS COMPARISON, SEE TABLE #9.


Polys.
Small Lymphs.
Temp.



Graph #21 shows:
Effect of removal of loop content on blood picture, and temperature in operated dog with a normal post-operative course. (Animal with distended loop, e.g. the loop contents being about 200 cc. as measured by single aspirations.
Aspiration of the loop contents causes:
Sharp decrease in the reds.
Slight increase in the whites.
Sharp decrease in the hemoglobin.
Sharp decrease in the polys.
Sharp rise in the small lymphocytes. (Table 10)
Drop in temperature of about .5 to 1.0 degrees. (see table for temperature data.)

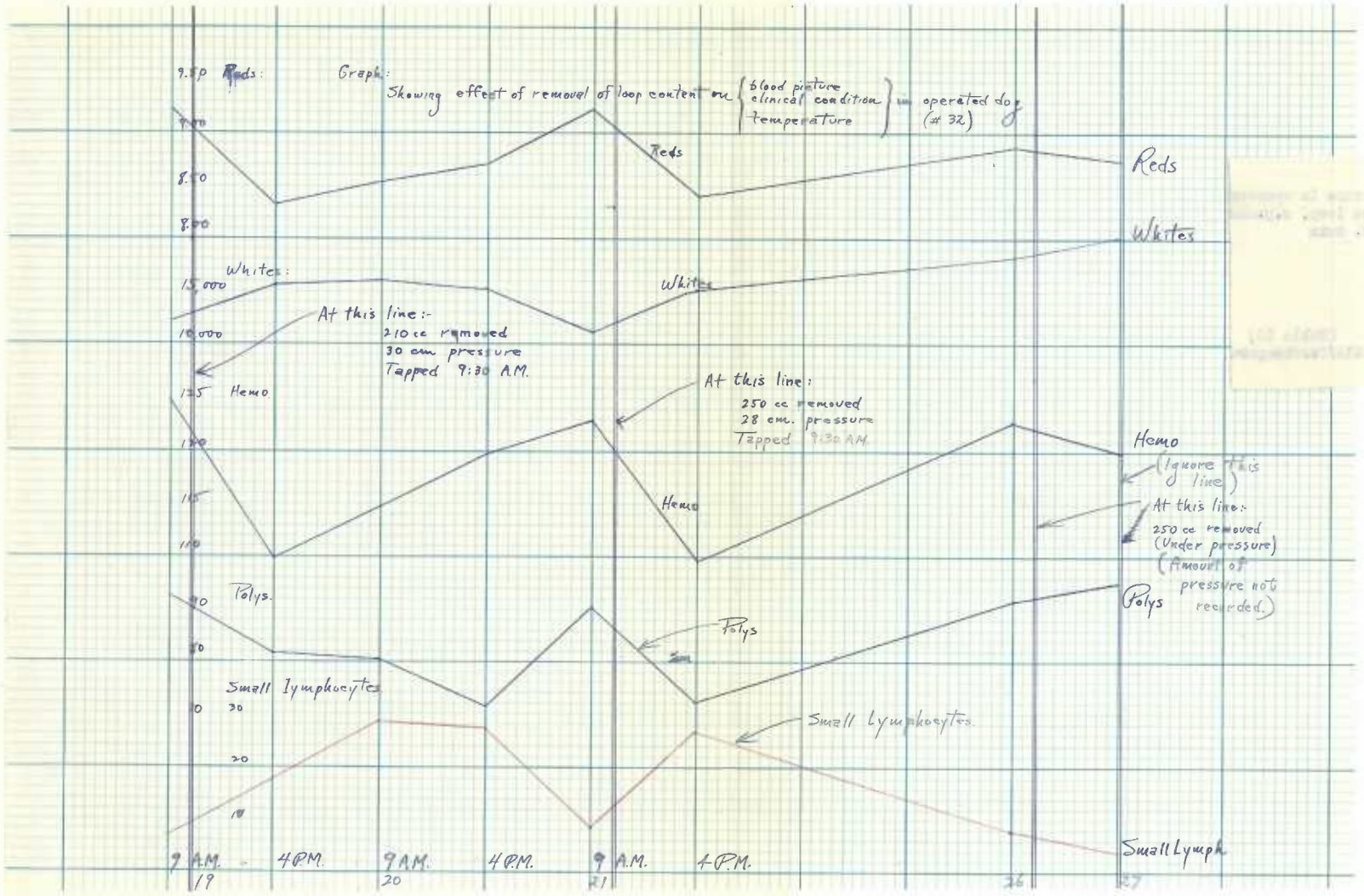

Graph:
Showing effect of removal of loop content on {Blood picture, clinical condition, temperature} in operated dog (# 32)
Reds:
Reds
Reds
Whites:
Whites
Whites
At this line:-
210 cc removed
30 cm pressure
Tapped 9:30 A.M.
Hemo
At this line:
250 cc removed
28 cm. pressure
Tapped 9:30 A.M.
Hemo
Hemo
(Ignore this line)
At this line:-
250 cc removed
(Under pressure)
(Amount of pressure not recorded.)
Polys.
Polys
Polys
Small Lymphocytes
Small Lymphocytes
Small Lymph
9 A.M.
4 P.M.
9 A.M.
4 P.M.
9 A.M.
4 P.M.
19
20
21
26
27

Plate showing effect of removal of loop content on blood picture, clinical condition, and temperature, in operated dog. (Using dog 32)

Date: 9-19-29 (Operated 5-29-29)

9 A.M. Before tapping:

Temp. 101.4 Tapped at 9:30 A.M. Removed 210 cc of fluid, under 30 cm. of water pressure.

Refuses food, vomiting, and in general condition.

Reds 9.27

White 12,350

Hemo 125%

Polys 93%

Small lymph 7%

4 P.M. (about 6 hours after tapping)

Temp. 100.2

Condition is much better. Eats with good appetite.

Reds 8.33

White 15,700

Hemo 110%

Polys 82%

Small lymph 18%

Date: 9-20-29 (Not tapped, to be run as a control).

9 A.M.

Temp 100.4

Has good appetite and seems to be in good dondition.

Reds 8.57

White 16,050

Hemo 115%

Polys 81%

Small lymph 29%

4 P.M.

Reds 8.71 Temp. 100.7

Whites 15.300

Hemo 120%

Polys 68%

Small lymph 32%

Date: 9-21-29

9 A.M. Before tapping:

Temp. 101.0 Tapped at 9:30 A.M. Removed 210 cc of fluid under 28 cm of water pressure.

Refuses food, vomiting, and in general poor condition.

9.25 reds

11.400 whites

109% hemo

91% polys

9% small lymph.

4 P.M. (about 6 hours after tapping)

Temp. 100.5

Now in good condition. Good appetite.

8.43 reds

15.450 whites

110% hemo

67% polys

33% small lymph

Date: 9-26-29

4:30 P.M. Before tapping.

Vomiting and in poor shape

8.88 reds

18.300 whites

123% hemo

92% polys

8% small lymph

Date: 9-27-29

9 A.M. Was tapped the afternoon before.

8.75 reds

20.900 whites

120% hemo

96% polys

4% small lymph

Final Record of animals used in series. Table 12

Dog Number	Date of Operation	Date of Death	Exper. Life	Cause of death
3	1-12-29	1-21-29	9 Days	Killed with ether.
4	1-14-29	2-7-29	24 days	general peritonitis.
5	1-17-29	1-23-29	6 days	General peritonitis. Perfor. Loop.
6	1-26-29	2-3-29	8 days	General peritonitis. Perfor. Loop.
7	1-29-29	1-31-29	2 days	General peritonitis.
8	2-5-29	2-10-29	5 days	General peritonitis. Perfor. Loop.
9	2-9-29	5-16-29	96 Days	General peritonitis. Perfor. Loop.
10	2-12-29	2-21-29	9 days	General peritonitis. Perfor. Loop.
11	2-22-29	2-26-29	4 days	General peritonitis. Perfor. Loop.
12	2-28-29	8-22-29	185 days	General peritonitis. Perfor. Loop.
13	3-9-29	5-1-29	53 Days	General peritonitis. Perfor. Loop.
14	3-23-29	3-26-29	3 days	Gen. Perit. Perfor. Loop.
15	3-30-29	Still living and in good health.		
16	4-6-29	4-12-29	6 days	Gen. Perit. Sponge. left in.
17	4-9-29	4-10-29	1 day	General Peritonitis. Perfor. anast
18	4-13-29	4-15-29	2 days	General peritonitis. Perfor. Loop.

Dog Number	Date of Operation	Date of Death	Exper. Life	Cause of Death
19	4-16-29	4-17-29	1 day	General peritonitis. Perfor. Loop.
20	4-17-29	9-24-29	160 days	Killed with ether.
21	4-20-29	4-25-29	5 days	General peritonitis. Perfor. Loop.
22	4-22-29	4-24-29	2 days	Gen. Perit. Perfor. Loop.
23	4-24-29	6-11-29	48 days	Inanition.
24	4-27-29	5-1-29	4 days	Gen. Perit. Perfor. Loop.
25	4-29-29	5-1-29	3 days	Gen. Perit. Perfor. Loop.
26	5-1-29	9-4-29	124 days	Gen. Perit. Perfor. Loop.
27	5-3-29	5-5-29	2 days	Unknown.
28	5-13-29	5-15-29	2 days	Gen. Perit. Perfor. Loop.
29	5-13-29	Died under anaesthesia.		
30	5-18-29	5-22-29	4 days	Respiratory infection.
31	5-20-29	9-23-29	126 days	Killed with ether.
32	5-29-29	Still living and well.		
33	6-3-29	Still Living and well.		
34	6-8-29	6-10-29	2 days	General perit. Perfor. Loop.
35	6-10-29	7-9-29	29 days	Gen. Perit. Perfor. Loop.
36	6-15-29	6-18-29	3 days	Gen. Perit. Perfor. Loop.
37	6-18-29	6-22-29	4 days	Gen. Perit.
38	6-20-29	6-25-29	5 days	Gen. Perit. Perfor. Loop.
39	6-22-29	6-25-29	3 days	Unknown.
40	6-27-29	7-1-29	4 days	Gen. Perit. Perfor. Loop.

Dog Number	Date of Operation	Date of Death	Exper. Life	Cause of Death.
41	Died during the operation.			
42	7-1-29	7-4-29	3 days	Gen. Perit. Perfor. Loop.
43	7-5-29	7-16-29	11 days	Gen. Perit. Perfor. Loop.
44	7-8-29	7-12-29	4 days	Gen. Perit. Perfor. Loop.
45	7-15-29	7-20-29	5 days	Gen. Perit. Perfor. Loop.
46	7-19-29	7-21-29	2 Days	Gangrenous intestine Gen. Peritonitis

Discussion.

A theoretical discussion of the results obtained in this study will not be given. The work was undertaken to find the relationships expressed in the title which might exist; in order that by means of these relationships a clearer understanding of the clinical condition of the animal and its relation to that of intestinal obstruction might be obtained. Much work has been done on the various phases of intestinal obstruction as well as its experimental similator, the isolated closed intestinal loop. Perhaps the results obtained here may be of value in the further clarification of the mysteries surrounding that great study.

In the carrying out of this problem, it was most essential to use control animals; in order that the effects of dehydration and fasting on the blood picture as well as the normal blood picture might be learned. An apology for the lack of hematocrit data may be offered here, as this certainly would give an exact insight into the role of dehydration in its effect upon the blood picture of normal as well as operated dehydrated animals. Hematocrit data was obtained on the animals used for the effect of dehydration on normal non-operated animals, but this data was not included, inasmuch as there was no hematocrit data on the operated animals used.

It was the original intention of the author to see if the condition of the loop could be predicted from a study of the blood picture presented by the operated animal. In order to investigate this relationship properly it was felt necessary to divide the animals into groups mentioned in the methods employed, viz., (1) Normal non-operated animals to be run as controls, (2) Operated animals with normal recovery following the operation, (3) Operated animals with infection complicating the post-operative course, and (4) operated animals with death in early or late peritonitis.

Summary of results and deductions:

1. The blood picture in a normal, healthy, well fed, non-operated dog, when examined daily or weekly, is found to remain quite constant.

2. The following blood picture is found to be the average in an examination of the blood of 47 normal, non-operated, well fed, healthy dogs:

7 million red blood cells per cubic millimeter of blood.

11,000 white blood cells per cubic millimeter of blood.

110% hemoglobin.

73% polymorphonuclears.

19% small lymphocytes.

3. The blood picture of normal, healthy, well fed, non-operated dogs may be readily altered by dehydration and fasting (witholding food and water). Estimating the first 24 hours of the fast as the first day, the second 24 hours of the fast as the second day, etc. there was noted:

a. A progressive fall in red cells, maximum on the 3rd day; followed by a return to normal on the 4th day; followed by a progressive increase above normal.

b. A profressive increase in whites, maximum on the second day, returning to normal on the 5th day.

c. A slow fall in hemoglobin, beginning on the second day, maximum fall on the 4th day; and normal again on the 6th day, followed by slow increase above normal.

d. The polys increase to a maximum on the second day, and are normal again on the 3rd day.

e. The small lymphocytes decrease to a minimum on the second day, and return to normal on the 3rd day.

f. Red, hemo. and small lymphocyte variations closely parallel each other.

g. The white blood cell and poly variation closely parallel each other.

h. The red and white cells vary inversely with each other. This variation in the blood picture as caused by dehydration and fasting evidently plays an important part in the change in the blood picture in dogs following operation; as the dogs are fasted and dehydrated as part of the routine post-operative treatment. The results show that the dehydration does cause a rise in the red cells and hemoglobin, and that a postoperative rise in red cells and hemoglobin after the 3rd or 4th day may be attributed to dehydration. Thus dehydration and fasting causes an <u>immediate</u> increase in polys and total white cells, followed by a return to normal; and a more <u>remote</u> increase in reds and hemoglobin.

4. A comparison of the blood pictures of operated dogs with normal post-operative recovery, with infected post-operative course; and with death due to the early onset of peritonitis shows:

a. Red cell counts thruout in all three are quite constant. Intermediate changes are probably due to vomiting or dehydration. High red cell counts usually associated with dehydration.

b. High white cell counts are associated with:

(1) Early post-operative recovery from trauma, shock, and infection during the course of the operation. Counts from 20,000 to 40,000.

(2) Infection, of the wound, causing counts around 23,000 with variation from day to day.

(3) Onset of peritonitis.

Esp. early peritonitis, e.g. on 4th day, counts around 30,000

Onset of late peritonitis in dog with long-drawn-out course may be associated with low white count, such as around 4,000, apparently due to the exhaustion of the resisting forces of the animal.

(4) Dehydration, esp. early in the course, as brought out above.

c. Hemoglobin is quite constant in all types of operated dogs, but may show the following changes:

(1) A gradual slow fall, probably due to malnutrtion or exhaustion of the animal.

(2) A sudden rise, due to extreme dehydration, in cases of obstruction of the anastomosis, distended loop, or early peritonitis, resulting in profuse vomiting and retching.

d. High poly count usually associated with sudden onset of peritonitis occuring early in the course or with distended loop. Infection of the wound, and dehydration apparently do not affect the poly count much. Low poly counts found in later portions of long drawn-out post-operative courses and in some cases in animals suddenly dying of peritonitis from ruptured distended loop, after a long drawn out course. Plys found to be very high on day of death in dogs dying early in the course from peritonitis from a ruptured loop.

e. Small lymphocytes vary inversely with the polys. In normal recovery dogs the small lymphocytes gradually fall from 25 to 10; in the infection type they gradually rise from 4-26 thruout the course. The peritonitis type they gradually fall from 14 to about 3 on the day of death.

5. Temperature findings:

a. Average daily temperature of a normal non-operated dog (taken per rectum at 8 A.M. daily is 100.2° F.

b. Using averages from dogs of the entire operated series, irrespective of the course of the operations, the following are the results found:

Av. Daily Temp on 1st Post-operative day = 101.0
" " " " 2nd " " " - 102.4
" " " " 3rd " " " - 101.7
" " " " 4th " " " - 101.9
" " " " 5th " " " - 101.4
" " " " 6th " " " - 101.2

Apparently the maximum temperature is on the second post-operative day. Temperature then remains about one degree above normal out as far as the 6th postoperative day. After the 6th day the temperature seems to gradually fall and in most cases during a normal recovery course was about 1 degree subnormal until the termination of the course. With the onset of peritonitis, as from a ruptured loop, the temperature would suddenly shoot up to 105 or 106.

c. Temperature in a normal healthy non-operated dog can vary from 100 to 102, usually averaging around 100 to 101.

d. In operated dogs with a normal recovery and with infection complicating the recovery, no definite relationship between the blood picture variations and the temperature variations can be seen.

e. Temperature in operated dogs with course terminating early in peritonitis shows a sudden rise (up to e.g. 105) corresponding to the onset of the peritonitis. Hence, the variations in the blood picture and temperature are both caused primarily by the sudden onset of the peritonitis, and not because the blood picture and temperature go hand in hand.

(further relationships of temperature to clinical condition are mentioned below)

f. A comparison of the temperature curves in normal non-operated animals, operated animals with normal recovery, with infected recovery, and with coursed terminating in early peritonotis shows:

1. Postoperative temperatures after the 6th day are usually about 1 degree below those found in a normal dog.

2. No striking difference in the types of curves is found.

3. Highest temperatures found in animals suddenly developing peritonitis.

Relationship to loop pressure etc is mentioned below.

6. A comparison of the red cell findings in the 4 types of dogs used shows:

a. Smoothest course found in operated dog with normal recovery.

b. Most variable course found in dog with wound infection.

c. At end of course the red cell count is highest in normal recovery type.

7. Comparison of the white cell findings in the 4 types of dogs used shows:

a. Operated dog with normal recovery shows the smoothest white cell course.

b. Operated dog with infection of the wound shows the most variable course, the not the highest. INFECTION IN A DOG SEEMS TO CAUSE AN ERRATIC WHITE CELL COURSE THO NOT NECESSARILY THE HIGHEST.

c. Operated dog with course terminating early in peritonitis shows the most rapid increase of whites to a final maximum.

d. Operated dog with normal recovery shows the highest white cell count attained during the post-operative course, viz. 40,000.

Peritonitis type second highest, viz..30,000.

Infection type third highest, viz.. 24,000.

e. Operated dog with post-operative course complicated by wound infection shows the lowest final white count, viz.. 4,000 (day of death). Apparently here the resisting factors of the host

are exhausted, even in the face of an active severe general peritonitis from a ruptured loop.

8. Comparison of the hemoglobin estimations in the 4 types of dogs used shows:

a. Normal non-operated dog shows the smoothest hemoglobin curve from day to day.

b. Operated dog with course complicated by infection shows the highest hemo values, as well as the most erratic.

c. Operated dog with course terminating in early peritonitis shows a rapidly increasing hemoglobin up to the day of death on about the third or fourth day.

9. Comparison of the polymorphonuclear white cell estimations in the 4 types of dogs used:

a. Poly count in dogs with post-operative wound infection is more variable from day to day than in the others. It also shows the highest value at the outset and the lowest value on the day of death of any of the 4 types.

b. The smoothest poly course is found in the operated dog with normal recovery.

10. Comparison of the small lymphocyte findings in the 4 types of animals used:

a. Small lymphocyte count in the dog with post-operative infection is the most variable from day to day. Here the count gradually climbs to a maximum on the 30th or day of death. This dog had the lowest small lymphocyte count at the beginning and the highest count at the end of the course.

b. Operated dog with normal recovery shows the smoothest small lymphocyte course.

11. Comparison of the volume of fluid within the loop to the clinical condition of the animal:

a. There is no constant definite relationship between the

volume of the loop contents and the clinical condition of the animal because:

(1) Animals ~~were~~ are ~~been~~ found to be in good condition with a maximally distended loop.

(2) Animals ~~were~~ are ~~been~~ found to be in good condition with an apparently empty loop.

(3) This reservation may be made, however: in every instance in which the animals condition ~~was~~ is recorded as being poor there ~~was~~ is a corresponding rapidly-filling distended loop present, which might account for the poor condition.

b. Loops seemed to refill with fluid more rapidly after being emptied during the first 40 days of the course, in dogs with normal recovery following the operation. The general condition of the animal is poorer during the first 40 days of the course, in these same dogs. It is possible to permit these animals to go without being tapped for longer intervals during the last half of their course, i.e. after about the 40th day. In early part of the course they are tapped nearly every other day; in the last half of their course tapping is not necessary for periods as long as 30 days.

12. Comparison of pressure of fluid within the loop to the clinical condition of the animal shows:

a. Animal is poorer for the most part when the pressure ~~was~~ is up and unrelieved. However there is no definite relationship found between the amount of pressure and the clinical condition of the animal:

(1) Animals are found in poor condition with both high and low pressures.

(2) Animals are found to be in poor condition with slowly and rapidly rising pressures.

b. The loop content pressure in general higher toward the end of the animals course. (in normal recovery operated animals)

c. The loop content pressure seems to increase more rapidly and

to necessitate more frequent tapping early in the animals course.
(in normal recovery operated animals)

13. Comparison of the loop content volume to the blood picture and temperature shows:

a. Smooth and slowly increasing red cell count is associated with a slowly filling loop, requiring infrequent tapping, with large volume removed at each tap, because :

(1) Reds increase when tapping not necessary.

(2) Reds decrease when frequent tapping necessary.

b. White cell counts seem to closely parallel the volume of the loop contents:

(1) Highest white counts found to correspond to highest loop volumes.

(2) Lowest white counts found to correspond to lowest loop volumes.

(3) White counts increase when the loop content volumes increase.

c. No definite relationship found to the hemoglobin found.

d. Polymorphonuclear counts seem to closely parallel the volume of the loop contents:

(1) Highest poly counts found to correspond to the highest loop volumes.

(2) Lowest poly counts found to correspond to the lowest loop volumes.

(3) Removal of loop contents often causes a sudden drop in polys.

(4) When tapping is neglected, the poly count gradually rises.

(5) Low poly counts nearly always associated with an empty or inactive loop.

e. Small lymph are low when the loop content volume is high, and vice versa.

f. There is a definite relationship between the temperature and

and the loop content volume.

(1) Temperatures are nearly normal with small loop volumes.

(2) Increase in loop content volume usually associated with an increase of 1 to 2 degrees in temperature.

(3) A slightly elevated temperature after tapping would promptly fall back to normal.

(4) Temperatures would increase as the loop contents would increase in volume.

14. Comparison of the loop content pressure to the blood picture and temperature shows:

a. High red cell counts associated with high loop pressures.

b. Relieval of loop pressure usually followed by a drop in red cells.

c. Highest red cell counts associated with slowly filling loops with high pressures.

d. High loop pressures associated with low white counts; low white counts associated with pressures over 30 cm. of water.

e. L ow Hemoglobins associated with low pressures and vice versa.

f. High poly counts associated with high loop pressures, in most cases. Relief of pressure often followed by a drop in poly count.

g. Low small lymphocyte counts associated with high pressures, and vice versa.

h. No definite relationship seen between the loop content pressure and the temperature.

15. Effect of removal of loop content on blood picture, clinical condition, and temperature in operated dog with normal recovery following the operation: (i.e. animal with distended loop e.g. loop contents about 200 cc).

a. Sharp decrease in red.

b. Slight increase in whites.

c. Sharp decrease in hemoglobin.

d. Sharp decrease in polys.

e. Sharp rise in small lymphocytes.

f. Drop in temperature of about .5 to 1 degree.

g. Marked improvement of clinical condition, cessation of vomiting, improvement of appetite, etc.

(Note: in making these observations for comparison in paragraph 15 the observations, counts and temperatures were taken 1/2 hour prior to and 6 hours after the loop content was removed).

Conclusions:

1. The blood picture in intestinal obstruction in dogs as exemplified by the closed jejunal loop (with intra-loop pressure of 50 cm. of water or more) is altered from the normal in the folbwing respects:

a. High red cell counts due to vomiting or long dehydration. Long drawn-out fall due malnutrition of the animal, in some cases. Otherwise normal.

b. High white cell counts due to operative trauma, wound infection, possible absorption of toxic products from the loop, peritonitis, or dehydration.

c. Gradual slow fall in hemoglobin, due to malnutrition of the animal.

Sudden rise, due to dehydration. Otherwise normal.

d. High percentage of polymorphonuclear leucocytes and low percentage of small lymphocytes due in most cases to sudden onset of peritonitis, and marked increase in pressure and volume of loop content.

2. The blood picture in intestinal obstruction in dogs as exemplified by the closed jejunal loop (where the intra-loop pressure is kept down by frequent aspiration and consequently the circulation to the loop unembarassed) is altered from the normal in the following respects:

a. An increase in red cells above normal only when aspiration is neglected. Otherwise normal.

b. A decrease in white cells below the average found in an operated dog of this type only when aspiration is neglected. Average white cell count in a dog of this type when properly and regularly aspirated is approximately 15,000 per cu. mm.

c. An increase in hemoglobin above normal only when tapping is neglected. Otherwise normal.

d. A high percentage of polymorphonuclear white blood cells and

and a low percentage of small lymphocytes only when the routine aspiration is neglected.

3. Findings in normal non-operated dogs:

From a study of 47 dogs:

7 million red blood cells per cubic millimeter of blood.

11,000 white blood cells per cubic millimeter of blood.

110% hemoglobin (Haskins-Sahli).

73% polymorphonuclear white blood cells.

19% small lymphocytes.

Average daily 8 A. M. rectal temperature 100.2 degrees (Farenheit).