“Anencephalic Blood Picture” or “Contra-striatal Blood Picture”, Produced Pharmacologically. A Second Possibility of Topical Diagnosis of Brain from Blood Picture Alone.

28th Hematological Paper.

By

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Introduction.

In 1924, Sato,¹⁾ one of us, proposed the possibility of the diagnosis of a brain lesion from the blood picture *alone* without seeing the patient. He called this picture the “Striatal Blood Picture”. Though we shall come to the problem later, we state in the present paper of another possibility of brain topic from the blood picture *alone*, to which suggest giving the name of the “Contra-striatal Blood Picture” or the “Anencephalic Blood Picture”.

In 1937, Kuribayashi,²⁾ one of us, wanted to investigate the blood picture of rabbits with cerebral hemispheres removed in order to further confirm that the “Striatal Blood Picture” would never occur in such rabbits, though Sato, one of the writers, knew it beforehand as revealed in an experiment on two rabbits. The former (Kuribayashi) however found a new fact unexpectedly during a precise study of the blood picture, of which we shall relate below.

*The “Striatal Blood Picture” and the
“Striatal Blood Symptom.”*

The “Striatal Blood Picture” is such a picture in which all the

1) A. Sato, Tohoku Igaku-Zasshi, 1924, 8, 79.

2) S. Kuribayashi, Tohoku J. Exp. Med., 1939, 35, 462.

myeloid leucocytes in the streaming blood will become negative to the peroxidase reaction (of Sato and Sekiya)³⁾, while they all remain positive to the oxidase reaction (of Winkler and Schultze) in the normal intensity. Sato, one of the writers, and Yoshimatsu were testing the copper peroxidase reaction, then devised by Sato of this paper, and Sekiya, in a number of patients to test whether the new peroxidase reaction could substitute the oxidase reaction of Winkler-Schultze. When they tested blood smears of two cases of acute lethargic encephalitis in a severe state, they were unable to stain the smears, no matter how often they repeated it, yet the oxidase reaction of Winkler-Schultze was positive and strong as ever in all the myeloid cells of the smears. Sato of this paper then tried a mechanical cerebral lesion in rabbits, until he at last succeeded in the "Peroxidase Puncture." In successfully peroxidase-punctured rabbits, blood will present the monstrous blood picture seen in the two cases of lethargic encephalitis: All the myeloid leucocytes will remain oxidase-positive in the normal intensity, while the peroxidase reaction will become negative in all the cells, as shown below:—

	Lethargic encephalitis	Peroxidase-punc- tured rabbits
All the myeloid leucocytes { Oxidase reaction in the streaming blood { Peroxidase reaction	+ —	+ —

This may well be called a "monstrous" blood picture, because a large majority of books of hematology treat both the oxidase and the peroxidase reactions as the same reaction under different names. Whitby and Britton's⁴⁾ book describes only peroxidase methods and uses the words "oxidase granules", "oxidase positive" instead of "peroxidase granules," "peroxidase positive". In Schleip and Alder's well known blood atlas⁵⁾ there is only one picture concerning the oxidase and the peroxidase reactions. And that one picture is the copper peroxidase reaction of Sato and Sekiya above mentioned. But the explanation to the picture is: "Oxydasereaktion nach Sato". And we ourselves might have considered both reactions as different names of the same reaction, as far as leucocytes are concerned, unless

3) A. Sato and S. Sekiya, Tohoku J. Exp. Med., 1926, 7, 111.

4) L. E. H. Whitby and C. J. C. Britton, Disorders of the Blood, 1935, London, 88, 485 and 486.

5) Scheip, K. u. Alder. A., Atlas der Blutkrankheiten, Berl. u. Wien, 1936, 3. Aufl.

we had not had such a peculiar experience as above stated. Now, Kuribayashi²⁾ wanted to confirm that the "Striatal Blood Picture" would not occur in rabbits with cerebral hemispheres removed, because these parts, as every body sees easily, are proximal and the "Peroxidase centres" are distal. He expected the normally strong oxidase and the normally strong peroxidase reaction of the myeloid leucocytes. Quite unexpectedly he found that the peroxidase reaction was abnormally intense, while the oxidase reaction was, he found, quite normal. He saw thus the counter picture of the "Striatal Blood Picture"; the normal oxidase reaction and the intensified peroxidase reaction, instead of the normal oxidase reaction and the lost peroxidase reaction.

Then an idea struck us: If cerebral hemispheres are paralysed with such a narcotic alkaloid as morphin, the same picture might occur. And then the normal blood picture would, as we thought, follow, if the effect of the drug is gone. The present experiment treats of the problem.

Method of Experiment.

1. Animals used.

Normal rabbits were put (three times) to Sato and Sakurada's⁶⁾ liver function test, and only b-classed (or with low liver power for ammonia-detoxication) animals were used.

2. Blood examination.

Blood was taken from an ear vessel before the injection, and 3 hours, 6 hours, 1 day, 1 day and 3 hours, 1 day and 6 hours, 2 days, 2 days and 6 hours, and 3 days after the injection. And then blood was examined again every 1 day until the 5th day of experiment in 5 out of 7 cases (Nos. 1, 2, 3, 4 and 5 in Tables 2, 3, 4, 5 and 6), in the remaining 2 cases (Nos. 6 and 7 in Table 8 and 9) on the 10th day of experiment.

3. Method of blood examination.

Blood smears were stained by the Tohoku Pediatric Method,⁷⁾ with a slight modification: Solution B was applied for 5 minutes instead of 1 minute in the Tohoku Pediatric Method.

4. Administration of morphine hydrochloride.

1% solution of morphine hydrochloride was subcutaneously used in the amount of from 21 c.c. to 30 c.c. per kilo of body weight. Each

6) A. Sato and H. Sakurada, Tohoku J. Exp. Med., 1927, 8, 347.

7) A. Sato, T. Suzuki and Ry. Shibata, Tohoku J. Exp. Med., 1934, 24, 195.

rabbit so treated was always in a paralytic state during the first two days.

It is very difficult to determine a dosis of morphine hydrochloride sufficient to keep rabbits always in a paralytic state. At first we looked up references in literature for fatal dosis of morphine hydrochloride for rabbits, and from the differing number of fatal dosis, according to different authors, we tried a paralytic dosis of rabbits.

The fatal dosis in literature is below (Cf. Table 1).

TABLE 1.
*The fatal dosis of morphine hydrochloride for rabbit
according to different authors.*

Grms. of morphine hydrochloride per kilo of body weight (subcutaneous)	Author
0.30	Heymansu and Van de Calseyde ⁸⁾
0.40	Willenberg ⁹⁾
0.25—0.50	Abe and Kosegawa ¹⁰⁾

5. Counting of peroxidase granules.

If human blood only is considered, it must be an exceedingly tedious work to count the peroxidase granules in neutrophiles, but in the case of a rabbit, it is not so difficult, because pseudoeosinophiles which may correspond to neutrophiles of human being show only a scanty number of peroxidase granules; besides, these are discrete in the case of rabbits, so we divided the granules into large and small ones according to the size (Cf. Figure).

Result of Experiment.

As stated above, peroxidase granules were counted,—peroxidase granules in 100 pseudoeosinophiles were numerically expressed. The change of peroxidase positive granules of pseudoeosinophile leucocytes was as follows :—

A total count of granules varied from 670 to 500 per 100 cells before the injection.

1. No. 1 Rabbit (Cf. Table 2).

Two days after the first injection, granules showed an increase in number and became stronger in the stain until the number of the

8) J. F. Heymansu and A. Van de Calseyde, Arch. de Pharmacodynamie et de Thérapie, 1901, 9, 104.

9) M. A. Willenberg, Biochem., Zeitsch., 1913, 48, 165.

10) K. Abe and Sh. Kosegawa, Jikken Yakubutugaku-Zasshi, 1931, 4, 181.

granules amounted to about 4.2 times the initial. And then granules gradually showed a tendency to decrease and returned to the initial count on the 5th day of experiment. The ratio of the large granules to the small was almost 1:1 two days after the first injection, while the ratio was 1:3 before the injection.

TABLE 2.

Peroxidase picture of rabbit to which 1% solution of morphine hydrochloride was subcutaneously injected in the amount of 24 c.c. per kilo of body weight.

No. of rabbit	Sex and class of rabbit	Body weight (in kilos)	Day of blood count	Time of blood count	Amount (c.c.) of 1% solution of morphine hydrochloride subcutaneously injected	Peroxidase granules of 100 pseudo eosinophile leucocytes		
						Count of peroxidase granules		
						Large granules	Small granules	Total granules
No. 1	♂ Rb	3.00	8. XII. (1937)	10:20 A.M. (Before injection)	60 c.c.	150	470	620
				10:30 A.M.				
			8. "	1:30 P.M. (3 hours after)		180	600	780
		2.95	8. "	4:30 P.M. (6 " ")	12 c.c.	260	550	810
			9. "	10:30 A.M. (1 day after)		860	910	1770
			9. "	1:30 P.A. (1 day and 3 hours after)		1070	1170	2240
			9. "	4:30 P.M. (1 " " 6 " ")		1210	1240	2450
		2.85	10. "	10:30 A.M. (2 days after)		1450	1140	2590
			10. "	4:30 P.M. (2 " " ")		730	1200	1930
		2.90	11. "	10:30 A.M. (3 " " ")		330	580	910
		2.90	12. "	10:30 A.M. (4 " " ")		150	580	730
		2.80	13. "	10:30 A.M. (5 " " ")		140	470	610

2. No. 2 Rabbit (Cf. Table 3).

Two days after the first injection, granules showed an increase in number and became stronger in the stain, and the number of the granules amounted to about 3.2 times the initial. Then granules showed a gradual decrease and returned to the initial count on the 4th day of experiment.

The ratio of the large granules to the small was 10 : 9 two days after the first injection, while it was 5 : 23 before the injection.

TABLE 3.

Peroxidase picture of rabbit to which 1% solution of morphine hydrochloride was subcutaneously injected in the amount of 21 c.c. per kilo of body weight.

No. of rabbit	Sex and class of rabbit	Body weight (in kilos)	Day of blood count	Time of blood count	Amount (c.c.) of 1% solution of morphine hydrochloride subcutaneously injected	Peroxidase granules of 100 pseudoeosinophile leucocytes		
						Count of peroxidase granules		
						Large granules	Small granules	Total granules
No. 2	♂ Rb	3.32	16. XII. (1937)	9 : 20 A.M.	60 c.c.	120	550	670
				9 : 30 A.M.				
		3.25	16. "	12 : 30 P.M. (3 hours after)	8 c.c.	180	580	760
			16. "	3 : 30 P.M. (6 " ")		260	740	1000
			17. "	9 : 30 A.M. (1 day after)		780	840	1620
			17. "	12 : 30 P.M. (1 day and 3 hours after)		820	900	1720
			17. "	3 : 30 P.M. (1 " " 6 " ")		1010	1020	2030
			18. "	9 : 30 A.M. (2 days after)		1120	1040	2160
		3.30	18. "	3 : 30 P.M. (2 days and 6 hours after)		740	1100	1840
			19. "	9 : 30 A.M. (3 days after)		150	570	720
		3.34	20. "	3 : 30 A.M. (4 " ")		130	520	650
			21. "	9 : 30 A.M. (5 " ")		130	530	660

3. No. 3 Rabbit (Cf. Table 4).

Two days after the first injection, granules showed an increase in number and became stronger in the stain, and the number of the granules amounted to about 4.1 times the initial. They then showed a gradual decrease and returned to the initial count on the 5th day of experiment.

The ratio of the large granules to the small was almost 1 : 1 two days after the first injection, whereas it was 5 : 18 before the injection.

TABLE 4.

Peroxidase picture of rabbit to which 1% solution of morphine hydrochloride was subcutaneously injected in the amount of 30 c.c. per kilo of body weight.

No. of rabbit	Sex and class of rabbit	Body weight (in kilos)	Day of blood count	Time of blood count	Amount (c.c.) of 1% solution of morphine hydrochloride subcutaneously injected	Peroxidase granules of 100 pseudoeosinophile leucocytes		
						Count of peroxidase granules		
						Large granules	Small granules	Total granules
No. 3	♂ Rb	3.07	20. XII. (1937)	9:20 A.M.	55 c.c.	130	470	600
				9:30 A.M.				
			20. "	12:30 P.M. (3 hours after)		180	560	740
		2.90	20. "	3:30 P.M. (6 " ")	35 c.c.	270	550	820
			21. "	9:30 A.M. (1 day after)		390	760	1150
			21. "	12:30 P.M. (1 day and 3 hours after)		510	790	1300
			21. "	3:30 P.M. (1 " " 6 " ")		790	890	1680
			22. "	9:30 A.M. (2 days after)		1270	1210	2480
			22. "	3:30 P.M. (2 days and 6 hours after)		520	950	1470
		2.82	23. "	9:30 P.M. (3 days after)		260	530	790
		2.88	24. "	9:30 P.M. (4 " ")		110	510	620
		2.85	25. "	9:30 P.M. (5 " ")		140	450	590

4. No. 4 Rabbit (Cf. Table 5).

Two days after the first injection, granules showed an increase in number and became stronger in the stain. At that time, the number of the granules amounted to about 3.3 times the initial. And then they showed a gradual decrease and returned to the initial count on the 4th day of experiment.

The ratio of the large granules and the small was almost 1:1 two days after the first injection, while it was about 1:3 before the injection.

TABLE 5.

Peroxidase picture of rabbit to which 1% solution of morphine hydrochloride was subcutaneously injected in the amount of 23 c.c. per kilo of body weight.

No. of rabbit	Sex and class of rabbit	Body weight (in kilos)	Day of blood count	Time of blood count	Amount (c.c.) of 1% solution of morphine hydrochloride subcutaneously injected	Peroxidase granules of 100 pseudoeosinophile leucocytes		
						Count of peroxidase granules		
						Large granules	Small granules	Total granules
No. 4	♀ Rb	2.43	25. XII. (1937)	9:20 A.M. (Before injection)	45 c.c.	150	470	620
				9:30 A.M.				
			25. "	12:30 P.M. (3 hours after)		190	570	760
		2.49	25. "	3:30 P.M. (6 " ")	20 c.c.	310	650	960
			26. "	9:30 A.M. (1 day after)		390	710	1100
			26. "	12:30 P.M. (1 day and 3 hours after)		520	800	1320
			26. "	3:30 P.M. (1 " " 6 " ")		720	800	1520
			2.40	9:30 A.M. (2 days after)		1000	1050	2050
			27. "	3:30 P.M. (2 days and 6 hours after)		530	870	1400
		2.50	28. "	9:30 A.M. (3 days after)		350	510	860
		2.50	29. "	9:30 A.M. (4 " ")		150	460	610
		2.50	30. "	9:30 A.M. (5 " ")		130	490	620

5. No. 5 Rabbit (Cf. Table 6).

Two days after the first injection, granules showed an increase in number and became stronger in the stain and the number of granules amounted to about 4 times the initial. Following this they showed a gradual decrease and returned to the initial count on the 5th day of experiment.

The ratio of the large granules and the small was almost 1:1 two days after the first injection, whereas it was 1:4 before the injection.

TABLE 6.

Peroxidase picture of rabbit to which 1% solution of morphine hydrochloride was subcutaneously injected in the amount of 29 c.c. per kilo of body weight.

No. of rabbit	Sex and class of rabbit	Body weight (in kilos)	Day of blood count	Time of blood count	Amount (c.c.) of 1% solution of morphine hydrochloride subcutaneously injected	Peroxidase granules of 100 pseudoecis-nophile leucocytes		
						Count of peroxidase granules		
						Large granules	Small granules	Total granules
No. 5	♀ Rb	3.04	10. I (1938)	9:20 A.M. (Before injection)	50 c.c.	120	470	590
				9:30 A.M.				
			10. "	12:30 P.M. (3 hours after)		220	510	730
		2.80	10. "	3:30 P.M. (6 " ")	37 c.c.	330	580	910
			11. "	9:30 A.M. (1 day after)		590	710	1300
			11. "	12:30 P.M. (1 day and 3 hours after)		670	840	1510
		2.80	11. "	3:30 P.M. (1 " " 6 " ")		830	1270	2100
			12. "	9:30 A.M. (2 days after)		1160	1160	2320
			12. "	3:30 P.M. (2 days and 6 hours after)		690	1000	1690
		2.70	13. "	9:30 A.M. (3 days after)		220	600	820
		2.73	14. "	9:30 A.M. (4 " ")		180	500	680
		3.00	15. "	9:30 A.M. (5 " ")		140	440	580

6. No. 6 Rabbit (Cf. Table 7).

Two days after the first injection, granules showed an increase in number and became stronger in the stain and the number of the granules amounted to about 3.8 times the initial. A gradual decrease and a return to the initial count was seen on the 4th day of experiment, and then neither an increase nor a decrease was seen up to the 10th day of experiment.

The ratio of the large granules to the small was almost 7:6 two days after the first injection, contrasting with about 1:4 before the injection.

TABLE 7.

Peroxidase picture of rabbit to which 1% solution of morphine hydrochloride was subcutaneously injected in the amount of 28 c.c. per kilo of body weight.

No. of rabbit	Sex and class of rabbit	Body weight (in kilos)	Day of blood count	Time of blood count	Amount (c.c.) of 1% solution of morphine hydrochloride subcutaneously injected	Peroxidase granules of 100 pseudoeosinophile leucocytes		
						Count of peroxidase granules		
						Large granules	Small granules	Total granules
No. 6	♂ Rb	2.97	17. I. (1938)	9:50 A.M.		140	540	680
				10 A.M.	50 c.c.			
			17. "	1 P.M. (3 hours after)		260	660	860
		2.86	17. "	4 P.M. (6 " ")		270	590	860
			18. "	10 A.M. (1 day after)	30 c.c.	450	650	1100
			18. "	1 P.M. (1 day and 3 hours after)		620	1200	1820
		2.88	18. "	4 P.M. (1 " " 6 " ")		1100	1200	2300
			19. "	10 A.M. (2 days after)		1400	1200	2600
			19. "	4 P.M. (2 days after 6 hours after)		540	1120	1660
		2.84	20. "	10 A.M. (3 days after)		230	630	860
		2.85	21. "	10 A.M. (4 " ")		170	500	670
		2.87	22. "	10 A.M. (5 " ")		159	500	659
		2.77	23. "	10 A.M. (6 " ")		180	490	670
		2.85	24. "	10 A.M. (7 " ")		170	530	700
		2.93	25. "	10 A.M. (8 " ")		130	540	670
		2.90	26. "	10 A.M. (9 " ")		180	540	720
		2.90	27. "	10 A.M. (10 " ")		140	500	640

7. No. 7 Rabbit (Cf. Table 8).

Two days after the first injection, granules showed an increase in number and became stronger in the stain. And two days after the injection, the number of the granules amounted to about 3.5 times the initial. Then a gradual decrease and a return to the initial count came

about on the 5th day of experiment and neither increase nor a decrease was seen up to the 10th day.

The ratio of the large and the small was almost 1 : 2 two days after the first injection, while it was about 1 : 4 before the injection.

TABLE 8.

Peroxidase picture of rabbit to which 1% solution of morphine hydrochloride was subcutaneously injected in the amount of 26 c.c. per kilo of body weight.

No. of rabbit	Sex and class of rabbit	Body weight (in kilos)	Day of blood count	Time of blood count	Amount (c.c.) of 1% solution of morphine hydrochloride subcutaneously injected	Peroxidase granules of 100 pseudo eosinophile leucocytes		
						Count of peroxidase granules		
						Large granules	Small granules	Total granules
No. 7	♂ Rb	2.67	25. I. (1938)	9:20 A.M. (Before injection)	40 c.c.	130	540	670
				9:30 P.M.				
		2.66	25. "	12:30 P.M. (3 hours after)	30 c.c.	160	540	700
			25. "	3:30 P.M. (6 " ")		250	610	860
			26. "	9:30 A.M. (1 day after)		440	800	1240
			26. "	12:30 P.M. (1 day and 3 hours after)		500	850	1350
			26. "	3:30 P.M. (1 day " 6 " ")		610	780	1390
			26.66 27. "	9:30 A.M. (2 days after)		1200	1150	2350
			27. "	3:30 A.M. (2 days and 6 hours after)		580	940	1520
			27.66 28. "	9:30 A.M. (3 days after)		320	610	930
			27.74 29. "	9:30 A.M. (4 " ")		240	500	740
			27.74 30. "	9:30 A.M. (5 " ")		180	480	660
			27.70 31. "	9:30 A.M. (6 " ")		170	500	670
			27.75 1. II.	9:30 A.M. (7 " ")		170	490	660
			27.70 2. "	9:30 A.M. (8 " ")		150	500	650
			27.72 3. "	9:30 A.M. (9 " ")		130	480	610
			27.70 4. "	9:30 A.M. (10 " ")		130	490	620

8. Relation between the peroxidase and the oxidase reaction.

When the oxidase reaction (of Winkler-Schultze) was performed on the blood films compared with the peroxidase reaction in pseudoeosinophiles, it was found that there was no change of the oxidase reaction, while the peroxidase reaction showed such a striking change as stated above. Thus, the oxidase reaction remained of quite a normal intensity after the experiment, while the peroxidase reaction became extraordinarily strong.

Comment.

As has been expected, the effect of morphine administration upon the blood picture—the normal oxidase and the intensified peroxidase reaction of the myeloid leucocytes in the circulating blood—was the same as in the case of the extirpation of cerebral hemispheres. The very peculiar blood picture was thus pharmacologically produced. But

TABLE 9.

Peroxidase picture of rabbit to which 1% solution of morphine hydrochloride was subcutaneously injected in the amount of 5 c.c. per kilo of body weight.

No. of rabbit	Sex and class of rabbit	Body weight (in kilos)	Day of blood count	Time of blood count	Amount (c.c.) of 1% solution of morphine hydrochloride subcutaneously injected	Peroxidase granules of 100 pseudoeosinophile leucocytes		
						Count of peroxidase granules		
						Large granules	Small granules	Total granules
No. 8	♂ Rb	2.4	22. II. (1938)	9:50 A.M. (Before injection)	12 c.c.	140	470	610
				10 A.M.				
			22. "	1 P.M. (3 hours after)		180	480	660
		2.45	22. "	4 P.M. (6 " ")		180	460	640
			23. "	10 A.M. (1 day after)		160	450	610
			24. "	10 A.M. (2 days after)		170	500	670
			26. "	10 A.M. (3 " ")		200	450	650
			26. "	10 A.M. (4 " ")		190	410	600
			27. "	10 A.M. (5 " ")		180	490	670

it is not to be misunderstood. Though the peculiar blood picture was produced by use of morphine, it will not follow by any means that this alkaloid produces it. Morphin can, when it is used in a certain amount, produce the picture. Smaller amounts of morphine hydrochloride had, as will be seen from Table 9 and 10 almost no influence on the peroxidase reaction, or on the oxidase reaction (Cf. Tables 9 and 10).

TABLE 10.

Peroxidase picture of rabbit to which 1% solution of morphine hydrochloride was subcutaneously injected in the amount of 10 c.c. per kilo of body weight.

No. of rabbit	Sex and class of rabbit	Body weight (in kilos)	Day of blood count	Time of blood count	Amount (c.c.) of 1% solution of morphine hydrochloride subcutaneously injected	Peroxidase granules of 100 pseudo eosinophile leucocytes Count of peroxidase granules		
						Large granules	Small granules	Total granules
No. 9	♂ Rb	2.10	28. II. (1938)	9:20 A.M. (Before injection)	21 c.c.	150	430	580
				9:30 A.M.				
			28. "	12:30 A.M. (3 hours after)		240	430	670
		2.10	28. "	3:30 P.M. (6 " ")		210	450	660
			1. III.	9:30 A.M. (1 day after)		260	480	740
			2. "	9:30 A.M. (2 days ")		250	500	750
			3. "	9:30 A.M. (3 " ")		260	520	780
			4. "	9:30 A.M. (4 " ")		150	390	540
			5. "	9:30 A.M. (5 " ")		150	430	580

Besides, no change (no intensification) of the oxidase reaction will show that the peculiar blood picture was not the result of overwhelming the blood stream with young blood cells. Young cells will, according to Ido and Suzuki,¹¹⁾ Ikeda,¹²⁾ Yamashita¹³⁾ and Naegeli,¹⁴⁾ come transiently into the circulating blood. And young cells

11) Y. Ido and S. Suzuki, Fukuoka Ikadaigaku Zassi, 1918, 12, 1.

12) W. Ikeda, Taiwan Igakkai Zassi, 1930, No. 308, 1315.

13) S. Yamashita, Juzenkai Zassi, 1931, 36, 1485.

14) O. Naegeli, Blutkrankheit u. Blutdiagnostik, 5th edit., 1931, Berlin, 332.

which have come into the blood will show a very strong oxidase reaction according to Magri,¹⁵⁾ but in the present case cells with a strong oxidase reaction were not seen.

It is thus clear that morphin was able to produce the same blood picture as in the case of the removal of cerebral hemispheres in the amount used. To what mechanism of the amount of the alkaloid we shall attribute production of the picture is an important question.

Though the exact situation of the "Peroxidase Centres" of Sato remains still unknown (Cf. the papers of Sato,¹⁶⁾ Simmel¹⁷⁾ and Mascher¹⁸⁾), yet it is not to be doubted that they are located either in

15) V. Magri, *Sperimentale*, 1934, 88, 242.

16) A. Sato, *Tohoku Igaku Zasshi*, 1924, 8, 79 and 90.

17) H. Simmel, *Mun. med. Wschr.*, 1931, 78, 660.

18) W. Mascher, *Zeitschrift f. kl. Med.*, 1933, 124, 306.

the diencephalon or in the mesencephalon. From these centres fibres go to a certain organ or organismus which secrete peroxidase into the circulating blood. But the telencephalon is controlling the activity of the "Peroxidase Centres" in the normal life to prevent an over-production of the enzyme. If the cerebral hemispheres are removed, the controlling mechanism will fall out and the over-production will ensue. Morphine in a large amount paralyses the telencephalon almost completely, so that the same result of the peroxidase over-production will ensue.

Now we suggest giving to the blood picture—the normal oxidase reaction and much intensified peroxidase reaction of all or almost all the myeloid leucocytes in the circulating blood—the following names :

1. The "Anencephalic Blood Picture" or "Atelencephalic Blood Picture", or 2. the "Contra-striatal Blood Picture", because the "Anencephalic Blood Picture" is just the counter-picture of the "Striatal Blood Picture". The following small table will explain the relations :—

Myeloid leucocytes of the circulating blood

	Normal picture	Striatal Blood Picture	Anencephalic Blood Picture (Contra-striatal Blood Picture)
Oxidase	+	+	+
Peroxidase	+	—	##

Conclusions.

In the "Striatal Blood Picture Sato" 1924, all the myeloid cells in the circulating blood were oxidase-positive and peroxidase-negative. Now the "Cantra-striatal Blood Picture"—with all the myeloid cells oxidase-positive and with peroxidase abnormally intensified—was produced in normal rabbits pharmacologically by morphin in a certain amount. The blood picture was the same as in the case of the extirpation of cerebral hemispheres, but, in human medicine, cases without cerebral hemispheres would be of almost no significance. Now in normal animals such a very peculiar blood picture was produced, and the possibility arises that such a blood picture may occur in human beings with cerebral affections. The "Anencephalic Blood Picture" or the "Contrastriatal Blood Picture" may thus occur in human cases with the brain not operated on.