Arakawa's Reaction of One Lactant Observed during One Year.

56th Report of the Peroxidase Reaction.

By

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It is a tedious work to follow Arakawa's reaction each day during the whole length of the admission of a breast-fed infant. It is a still far more difficult task to do the same during a whole year in the case of a healthy baby. I desire to report here a clinical experience as well as a clinical experiment concerning the Arakawa reaction observed during one whole year on a healthy lactant with a normal baby.

METHOD OF INVESTIGATION.

1. Mother's milk was collected at 8 o'clock A. M. every day, and always before feeding. The amount collected each time was more than 5 c.c. from each breast. Though the amount necessary for testing Arakawa's reaction is 1 c.c., it is always desirable to collect a much larger amount than 1 c.c., to obtain a reliable result, but collecting more than 5 c.c. every day during the whole year was a difficult task of course.

2. Arakawa's reaction of the milk samples were done within three hours of obtaining, and the reaction itself was followed as late as 5 minutes. And the time of the first appearance of (++) was marked with a sign for comparison (Cf. Thick types in Tables).

3. State of mother and baby at birth. The lactant was 23 years of age, a healthy primipara with only a slight nausea gravidarum in her pregnancy. The term expected was May 22nd 1933, but the actual

birth took place on May 25th. No accident in puerperium. Both breasts of an almost equal size; nips not abnormal, abundant secretion. Child, 2900 grms. at birth, severing of umbilical cord on the fifth day after birth. One week after birth, slight jaundice of a short duration.

RESULT OF INVESTIGATION.

1. Arakawa's Reaction Observed during One Year.

We have known from our daily clinical experience that in most cases Arakawa's reaction of one lactant is not absolutely constant every day, but we have never before investigated the reaction so long as one year.

It is important in the first place to mention that human milk should be strongly positive to Arakawa's reaction and remain so in an ideal case, because Arakawa-positive human milk is a good milk as has been shown in a number of papers¹⁻⁸⁾ from our Laboratory: The following is an

example of constant and good Arakawa's reaction (Cf. Table I).

But a succession of such ideal reactions or an absolutely constant and good reaction is rather an exceptional case. In most cases, mammary glands secrete human milk more

TABLE I.

*Constant and strong Arakawa's reaction
(of mother of an infant of 11 months).*

Date	Arakawa's reaction											
	Right						Left					
	0'	1'	2'	3'	4'	5'	0'	1'	2'	3'	4'	5'
23. VII	(+)	(++)	(+++)	(+++)	(+++)	(+++)	(++)	(+++)	(+++)	(+++)	(+++)	(+++)
24. "	(+)	(++)	(++)	(++)	(++)	(++)	(++)	(+++)	(+++)	(+++)	(+++)	(+++)
25. "	(+)	(++)	(++)	(++)	(+++)	(+++)	(++)	(+++)	(+++)	(+++)	(+++)	(+++)
26. "	(+)	(++)	(++)	(+++)	(+++)	(+++)	(-)	(++)	(+++)	(+++)	(+++)	(+++)
27. "	(+)	(++)	(+++)	(+++)	(+++)	(+++)	(++)	(+++)	(+++)	(+++)	(+++)	(+++)
28. "	(+)	(++)	(+++)	(+++)	(+++)	(+++)	(+)	(+++)	(+++)	(+++)	(+++)	(+++)
29. "	(+)	(++)	(+++)	(+++)	(+++)	(+++)	(++)	(+++)	(+++)	(+++)	(+++)	(+++)
30. "	(+)	(++)	(+++)	(+++)	(+++)	(+++)	(++)	(+++)	(+++)	(+++)	(+++)	(+++)
31. "	(+)	(++)	(+++)	(+++)	(+++)	(+++)	(++)	(+++)	(+++)	(+++)	(+++)	(+++)
1. VIII	(+)	(++)	(+++)	(+++)	(+++)	(+++)	(++)	(+++)	(+++)	(+++)	(+++)	(+++)
2. "	(+)	(++)	(+++)	(+++)	(+++)	(+++)	(++)	(+++)	(+++)	(+++)	(+++)	(+++)
3. "	(+)	(++)	(+++)	(+++)	(+++)	(+++)	(++)	(+++)	(+++)	(+++)	(+++)	(+++)

1) A. Sato, Jikken Iho, 1932, **18**, 1292.

2) A. Sato, Jikken Iho, 1933, **19**, 1554.

3) M. Chiba, Tohoku J. Exp. Med., 1932, **19**, 486.

4) T. Suzuki, Tohoku J. Exp. Med., 1934, **23**, 23.

5) J. Nozaki, Tohoku J. Exp. Med., 1934, **23**, 60.

6) A. Takamatsu and A. Sato, Tohoku J. Exp. Med., 1934, **23**, 506.

7) K. Asakura, Tohoku J. Exp. Med., 1932, **19**, 275.

8) J. Kimura, Tohoku J. Exp. Med., 1934, **23**, 494.

TABLE II.

Arakawa's Reaction of Human Milk of a Lactant during One Whole Year.

Age of child (Days)	Date		Arakawa's reaction											
			Right						Left					
			(0')	(1')	(2')	(3')	(4')	(5')	(0')	(1')	(2')	(3')	(4')	(5')
5	31.	V	(-)	(±)	(+)	(+)	(+)	(+)	(-)	(-)	(±)	(+)	(+)	(+)
6	1.	VI	(-)	(+)	(+)	(+)	(+)	(+)	(-)	(+)	(+)	(+)	(+)	(+)
7	2.	"	(-)	(+)	(+)	(+)	(+)	(+)	(-)	(+)	(+)	(+)	(+)	(+)
8	3.	"	(-)	(±)	(+)	(+)	(+)	(+)	(-)	(±)	(+)	(+)	(+)	(+)
9	4.	"	(±)	(+)	(+)	(+)	(+)	(+)	(±)	(+)	(+)	(+)	(+)	(+)
10	5.	"	(±)	(+)	(+)	(+)	(+)	(+)	(-)	(±)	(+)	(+)	(+)	(+)
11	6.	"	(±)	(+)	(+)	(+)	(+)	(+)	(±)	(+)	(+)	(+)	(+)	(+)
12	7.	"	(-)	(-)	(-)	(±)	(+)	(+)	(-)	(-)	(±)	(+)	(+)	(+)
13	8.	"	(±)	(±)	(+)	(+)	(+)	(+)	(-)	(±)	(+)	(+)	(+)	(+)
14	9.	"	(-)	(+)	(±)	(+)	(+)	(+)	(±)	(+)	(+)	(+)	(+)	(+)
15	10.	"	(±)	(+)	(+)	(+)	(+)	(+)	(±)	(+)	(+)	(+)	(+)	(+)
16	11.	"	(±)	(+)	(+)	(+)	(+)	(+)	(±)	(+)	(+)	(+)	(+)	(+)
17	12.	"	(±)	(+)	(+)	(+)	(+)	(+)	(±)	(+)	(+)	(+)	(+)	(+)
18	13.	"	(±)	(±)	(+)	(+)	(+)	(+)	(±)	(+)	(+)	(+)	(+)	(+)
19	14.	"	(+)	(+)	(+)	(+)	(+)	(+)	(±)	(+)	(+)	(+)	(+)	(+)
20	15.	"	(+)	(+)	(+)	(+)	(+)	(+)	(-)	(-)	(±)	(+)	(+)	(+)
21	16.	"	(±)	(+)	(+)	(+)	(+)	(+)	(-)	(-)	(±)	(+)	(+)	(+)
22	17.	"	(-)	(+)	(+)	(+)	(+)	(+)	(-)	(-)	(±)	(+)	(+)	(+)
23	18.	"	(±)	(+)	(+)	(+)	(+)	(+)	(-)	(-)	(±)	(+)	(+)	(+)
24	19.	"	(+)	(+)	(+)	(+)	(+)	(+)	(±)	(+)	(+)	(+)	(+)	(+)
25	20.	"	(±)	(+)	(+)	(+)	(+)	(+)	(±)	(+)	(+)	(+)	(+)	(+)
26	21.	"	(-)	(±)	(+)	(+)	(+)	(+)	(-)	(±)	(+)	(+)	(+)	(+)
27	22.	"	(-)	(+)	(+)	(+)	(+)	(+)	(±)	(+)	(+)	(+)	(+)	(+)
28	23.	"	(-)	(-)	(+)	(+)	(+)	(+)	(±)	(+)	(+)	(+)	(+)	(+)
29	24.	"	(±)	(+)	(+)	(+)	(+)	(+)	(±)	(+)	(+)	(+)	(+)	(+)
30	25.	"	(±)	(+)	(+)	(+)	(+)	(+)	(-)	(-)	(+)	(+)	(+)	(+)
31	26.	"	(±)	(+)	(+)	(+)	(+)	(+)	(±)	(+)	(+)	(+)	(+)	(+)
32	27.	"	(±)	(+)	(+)	(+)	(+)	(+)	(±)	(+)	(+)	(+)	(+)	(+)
33	28.	"	(+)	(+)	(+)	(+)	(+)	(+)	(-)	(+)	(+)	(+)	(+)	(+)
34	29.	"	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
35	30.	"	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
36	1.	VII	(+)	(+)	(+)	(+)	(+)	(+)	(-)	(-)	(-)	(-)	(+)	(+)
37	2.	"	(+)	(+)	(+)	(+)	(+)	(+)	(-)	(+)	(+)	(+)	(+)	(+)
38	3.	"	(+)	(+)	(+)	(+)	(+)	(+)	(-)	(+)	(+)	(+)	(+)	(+)
39	4.	"	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
40	5.	"	(±)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
41	6.	"	(±)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
42	7.	"	(±)	(+)	(+)	(+)	(+)	(+)	(-)	(+)	(+)	(+)	(+)	(+)
43	8.	"	(±)	(+)	(+)	(+)	(+)	(+)	(±)	(+)	(+)	(+)	(+)	(+)
44	9.	"	(±)	(+)	(+)	(+)	(+)	(+)	(±)	(+)	(+)	(+)	(+)	(+)
49	14.	VII	(+)	(+)	(+)	(+)	(+)	(+)	(±)	(+)	(+)	(+)	(+)	(+)
50	15.	"	(±)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
60	25.	VII	(±)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
61	26.	"	(±)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
62	27.	"	(±)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
63	28.	"	(±)	(+)	(+)	(+)	(+)	(+)	(±)	(+)	(+)	(+)	(+)	(+)
66	31.	VII	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
69	3.	VIII	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
70	4.	"	(±)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
71	5.	"	(-)	(±)	(+)	(+)	(+)	(+)	(-)	(+)	(+)	(+)	(+)	(+)
73	7.	"	(-)	(+)	(+)	(+)	(+)	(+)	(-)	(+)	(+)	(+)	(+)	(+)
74	8.	"	(-)	(-)	(-)	(-)	(-)	(±)	(-)	(±)	(+)	(+)	(+)	(+)

Age of child (Days)	Date	A r a k a w a's reaction											
		Right						Left					
		(0')	(1')	(2')	(3')	(4')	(5')	(0')	(1')	(2')	(3')	(4')	(5')
75	9. VIII	(-)	(±)	(±)	(+)	(+)	(+)	(-)	(+)	(+)	(H)	(H)	(H)
76	10. "	(+)	(H)	(H)	(H)	(H)	(H)	(+)	(H)	(H)	(H)	(H)	(H)
79	13. "	(-)	(+)	(H)	(H)	(H)	(H)	(-)	(+)	(H)	(H)	(H)	(H)
80	14. "	(±)	(H)	(H)	(H)	(H)	(H)	(+)	(H)	(H)	(H)	(H)	(H)
81	15. "	(+)	(H)	(H)	(H)	(H)	(H)	(±)	(H)	(H)	(H)	(H)	(H)
83	17. "	(+)	(H)	(H)	(H)	(H)	(H)	(±)	(+)	(H)	(H)	(H)	(H)
84	18. "	(±)	(+)	(H)	(+)	(H)	(H)	(-)	(H)	(H)	(H)	(H)	(H)
87	21. "	(H)	(H)	(H)	(H)	(H)	(H)	(±)	(+)	(+)	(H)	(H)	(H)
88	22. "	(+)	(H)	(H)	(H)	(H)	(H)	(-)	(H)	(H)	(H)	(H)	(H)
89	23. "	(H)	(H)	(H)	(H)	(H)	(H)	(+)	(H)	(H)	(H)	(H)	(H)
90	24. "	(+)	(H)	(H)	(H)	(H)	(H)	(+)	(H)	(H)	(H)	(H)	(H)
95	29. "	(±)	(+)	(H)	(H)	(H)	(H)	(+)	(H)	(H)	(H)	(H)	(H)
96	30. "	(±)	(+)	(H)	(H)	(H)	(H)	(+)	(H)	(H)	(H)	(H)	(H)
97	31. "	(+)	(H)	(H)	(H)	(H)	(H)	(+)	(+)	(H)	(H)	(H)	(H)
98	1. IX	(+)	(H)	(H)	(H)	(H)	(H)	(±)	(H)	(H)	(H)	(H)	(H)
99	2. "	(-)	(+)	(H)	(H)	(H)	(H)	(+)	(H)	(H)	(H)	(H)	(H)
100	3. "	(+)	(H)	(H)	(H)	(H)	(H)	(+)	(H)	(H)	(H)	(H)	(H)
101	4. "	(+)	(H)	(H)	(H)	(H)	(H)	(+)	(H)	(H)	(H)	(H)	(H)
103	6. "	(+)	(H)	(H)	(H)	(H)	(H)	(+)	(H)	(H)	(H)	(H)	(H)
105	8. "	(+)	(H)	(H)	(H)	(H)	(H)	(+)	(H)	(H)	(H)	(H)	(H)
106	9. "	(+)	(H)	(H)	(H)	(H)	(H)	(+)	(H)	(H)	(H)	(H)	(H)
107	10. "	(+)	(H)	(H)	(H)	(H)	(H)	(+)	(H)	(H)	(H)	(H)	(H)
108	11. "	(±)	(H)	(H)	(H)	(H)	(H)	(+)	(H)	(H)	(H)	(H)	(H)
109	12. "	(-)	(+)	(H)	(H)	(H)	(H)	(-)	(+)	(H)	(H)	(H)	(H)
114	17. "	(+)	(H)	(H)	(H)	(H)	(H)	(±)	(H)	(H)	(H)	(H)	(H)
116	19. "	(+)	(H)	(H)	(H)	(H)	(H)	(+)	(H)	(H)	(H)	(H)	(H)
117	20. "	(±)	(H)	(H)	(H)	(H)	(H)	(+)	(H)	(H)	(H)	(H)	(H)
120	23. "	(+)	(H)	(H)	(H)	(H)	(H)	(±)	(H)	(H)	(H)	(H)	(H)
121	24. "	(±)	(H)	(H)	(H)	(H)	(H)	(+)	(H)	(H)	(H)	(H)	(H)
122	25. "	(-)	(H)	(H)	(H)	(H)	(H)	(-)	(+)	(H)	(H)	(H)	(H)
123	26. "	(+)	(H)	(H)	(H)	(H)	(H)	(±)	(H)	(H)	(H)	(H)	(H)
124	27. "	(+)	(H)	(H)	(H)	(H)	(H)	(-)	(H)	(H)	(H)	(H)	(H)
126	29. "	(-)	(+)	(H)	(H)	(H)	(H)	(-)	(+)	(H)	(H)	(H)	(H)
127	30. "	(±)	(H)	(H)	(H)	(H)	(H)	(±)	(H)	(H)	(H)	(H)	(H)
128	1. X	(±)	(H)	(H)	(H)	(H)	(H)	(±)	(H)	(H)	(H)	(H)	(H)
129	2. "	(-)	(+)	(H)	(H)	(H)	(H)	(±)	(H)	(H)	(H)	(H)	(H)
130	3. "	(±)	(H)	(H)	(H)	(H)	(H)	(±)	(H)	(H)	(H)	(H)	(H)
131	4. "	(+)	(H)	(H)	(H)	(H)	(H)	(±)	(+)	(H)	(H)	(H)	(H)
132	5. "	(±)	(H)	(H)	(H)	(H)	(H)	(±)	(H)	(H)	(H)	(H)	(H)
133	6. "	(+)	(H)	(H)	(H)	(H)	(H)	(+)	(H)	(H)	(H)	(H)	(H)
134	7. "	(+)	(H)	(H)	(H)	(H)	(H)	(±)	(H)	(H)	(H)	(H)	(H)
135	8. "	(+)	(H)	(H)	(H)	(H)	(H)	(±)	(H)	(H)	(H)	(H)	(H)
138	11. "	(-)	(+)	(H)	(H)	(H)	(H)	(±)	(H)	(H)	(H)	(H)	(H)
139	12. "	(±)	(H)	(H)	(H)	(H)	(H)	(±)	(H)	(H)	(H)	(H)	(H)
140	13. "	(±)	(H)	(H)	(H)	(H)	(H)	(±)	(H)	(H)	(H)	(H)	(H)
141	14. "	(-)	(+)	(H)	(H)	(H)	(H)	(+)	(H)	(H)	(H)	(H)	(H)
142	15. "	(±)	(+)	(H)	(H)	(H)	(H)	(+)	(H)	(H)	(H)	(H)	(H)
143	16. "	(-)	(+)	(H)	(H)	(H)	(H)	(±)	(H)	(H)	(H)	(H)	(H)
145	18. "	(-)	(+)	(H)	(H)	(H)	(H)	(-)	(+)	(H)	(H)	(H)	(H)
146	19. "	(±)	(H)	(H)	(H)	(H)	(H)	(+)	(H)	(H)	(H)	(H)	(H)
147	20. "	(±)	(H)	(H)	(H)	(H)	(H)	(±)	(H)	(H)	(H)	(H)	(H)
148	21. "	(+)	(H)	(H)	(H)	(H)	(H)	(±)	(H)	(H)	(H)	(H)	(H)
149	22. "	(±)	(+)	(H)	(H)	(H)	(H)	(±)	(H)	(H)	(H)	(H)	(H)
150	23. "	(±)	(+)	(H)	(H)	(H)	(H)	(+)	(H)	(H)	(H)	(H)	(H)
151	24. "	(+)	(H)	(H)	(H)	(H)	(H)	(±)	(H)	(H)	(H)	(H)	(H)
152	25. "	(+)	(H)	(H)	(H)	(H)	(H)	(±)	(H)	(H)	(H)	(H)	(H)

Age of child (Days)	Date	Arakawa's reaction											
		Right						Left					
		(0')	(1')	(2')	(3')	(4')	(5')	(0')	(1')	(2')	(3')	(4')	(5')
225	6.	I	(-)	(+)	(+)	(+)	(+)	(-)	(+)	(+)	(+)	(+)	(+)
226	7.	"	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
227	8.	"	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
228	9.	"	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
229	10.	"	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
230	11.	"	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
231	12.	"	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
232	13.	"	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
233	14.	"	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
234	15.	"	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
235	16.	"	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
236	17.	"	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
237	18.	"	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
238	19.	"	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
239	20.	"	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
240	21.	"	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
241	22.	"	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
242	23.	"	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
243	24.	"	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
244	25.	"	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
246	27.	"	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
250	31.	"	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
251	1.	II	(-)	(+)	(+)	(+)	(+)	(-)	(+)	(+)	(+)	(+)	(+)
252	2.	"	(-)	(+)	(+)	(+)	(+)	(-)	(+)	(+)	(+)	(+)	(+)
253	3.	"	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
254	4.	"	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
255	5.	"	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
256	6.	"	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
257	7.	"	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
258	8.	"	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
259	9.	"	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
260	10.	"	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
261	11.	"	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
262	12.	"	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
263	13.	"	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
264	14.	"	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
265	15.	"	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
266	16.	"	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
267	17.	"	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
268	18.	"	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
269	19.	"	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
270	20.	"	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
272	22.	"	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
273	23.	"	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
275	25.	"	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
276	26.	"	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
277	27.	"	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
278	28.	"	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
279	1.	III	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
280	2.	"	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
281	3.	"	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
282	4.	"	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
283	5.	"	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
284	6.	"	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
285	7.	"	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
286	8.	"	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)

1st menstruation

Age of child (Days)	Date		A r a k a w a's reaction											
			Right						Left					
			(0')	(1')	(2')	(3')	(4')	(5')	(0')	(1')	(2')	(3')	(4')	(5')
287	9.	III	(-)	(+)	(++)	(++)	(++)	(++)	(-)	(+)	(+)	(+)	(++)	(++)
288	10.	"	(-)	(-)	(±)	(±)	(+)	(+)	(-)	(±)	(+)	(++)	(++)	(++)
289	11.	"	(-)	(±)	(+)	(++)	(++)	(++)	(±)	(+)	(++)	(++)	(++)	(++)
290	12.	"	(-)	(±)	(+)	(+)	(++)	(++)	(±)	(+)	(++)	(++)	(++)	(++)
291	13.	"	(-)	(±)	(±)	(+)	(+)	(++)	(-)	(±)	(+)	(++)	(++)	(++)
292	14.	"	(-)	(-)	(±)	(+)	(+)	(+)	(-)	(+)	(+)	(++)	(++)	(++)
293	15.	"	(-)	(-)	(±)	(±)	(+)	(+)	(-)	(±)	(+)	(++)	(++)	(++)
294	16.	"	(-)	(+)	(+)	(++)	(++)	(++)	(-)	(+)	(+)	(++)	(++)	(++)
295	17.	"	(-)	(±)	(+)	(+)	(++)	(++)	(-)	(±)	(+)	(++)	(++)	(++)
296	18.	"	(-)	(±)	(+)	(+)	(++)	(++)	(-)	(±)	(+)	(++)	(++)	(++)
297	19.	"	(-)	(-)	(±)	(+)	(+)	(+)	(-)	(+)	(+)	(++)	(++)	(++)
298	20.	"	(-)	(±)	(+)	(+)	(++)	(++)	(-)	(+)	(++)	(++)	(++)	(++)
299	21.	"	(-)	(-)	(±)	(+)	(+)	(+)	(-)	(±)	(+)	(++)	(++)	(++)
300	22.	"	(-)	(-)	(±)	(±)	(±)	(±)	(±)	(+)	(++)	(++)	(++)	(++)
301	23.	"	(-)	(+)	(++)	(++)	(++)	(++)	(-)	(+)	(++)	(++)	(++)	(++)
302	24.	"	(-)	(±)	(+)	(+)	(++)	(++)	(-)	(±)	(+)	(++)	(++)	(++)
303	25.	"	(+)	(++)	(++)	(++)	(++)	(++)	(-)	(+)	(++)	(++)	(++)	(++)
304	26.	"	(-)	(±)	(±)	(+)	(+)	(++)	(-)	(+)	(++)	(++)	(++)	(++)
305	27.	"	(-)	(+)	(++)	(++)	(++)	(++)	(-)	(±)	(+)	(++)	(++)	(++)
306	28.	"	(±)	(+)	(++)	(++)	(++)	(++)	(-)	(±)	(+)	(++)	(++)	(++)
307	29.	"	(-)	(+)	(++)	(++)	(++)	(++)	(-)	(+)	(++)	(++)	(++)	(++)
308	30.	"	(-)	(+)	(++)	(++)	(++)	(++)	(±)	(+)	(++)	(++)	(++)	(++)
314	5.	IV	(±)	(+)	(++)	(++)	(++)	(++)	(-)	(+)	(++)	(++)	(++)	(++)
315	6.	"	(-)	(±)	(+)	(+)	(++)	(++)	(-)	(+)	(++)	(++)	(++)	(++)
316	7.	"	(-)	(±)	(++)	(++)	(++)	(++)	(-)	(±)	(++)	(++)	(++)	(++)
317	8.	"	(-)	(+)	(++)	(++)	(++)	(++)	(±)	(+)	(++)	(++)	(++)	(++)
318	9.	"	(-)	(±)	(+)	(++)	(++)	(++)	(±)	(+)	(++)	(++)	(++)	(++)
319	10.	"	(±)	(+)	(++)	(++)	(++)	(++)	(±)	(+)	(++)	(++)	(++)	(++)
320	11.	"	(±)	(+)	(++)	(++)	(++)	(++)	(±)	(+)	(++)	(++)	(++)	(++)
321	12.	"	(-)	(±)	(+)	(++)	(++)	(++)	(-)	(+)	(++)	(++)	(++)	(++)
322	13.	"	(+)	(++)	(++)	(++)	(++)	(++)	(-)	(+)	(++)	(++)	(++)	(++)
323	14.	"	(±)	(++)	(++)	(++)	(++)	(++)	(±)	(+)	(++)	(++)	(++)	(++)
324	15.	"	(±)	(++)	(++)	(++)	(++)	(++)	(-)	(±)	(+)	(++)	(++)	(++)
325	16.	"	(-)	(±)	(+)	(++)	(++)	(++)	(-)	(+)	(++)	(++)	(++)	(++)
326	17.	"	(-)	(±)	(+)	(++)	(++)	(++)	(-)	(+)	(++)	(++)	(++)	(++)
327	18.	"	(+)	(++)	(++)	(++)	(++)	(++)	(-)	(±)	(+)	(++)	(++)	(++)
328	19.	"	(-)	(±)	(+)	(+)	(++)	(++)	(-)	(+)	(++)	(++)	(++)	(++)
329	20.	"	(±)	(+)	(++)	(++)	(++)	(++)	(-)	(±)	(+)	(++)	(++)	(++)
330	21.	"	(±)	(+)	(++)	(++)	(++)	(++)	(-)	(±)	(+)	(++)	(++)	(++)
331	22.	"	(-)	(+)	(++)	(++)	(++)	(++)	(-)	(+)	(++)	(++)	(++)	(++)
332	23.	"	(-)	(±)	(+)	(++)	(++)	(++)	(-)	(±)	(+)	(++)	(++)	(++)
333	24.	"	(-)	(-)	(±)	(±)	(±)	(±)	(±)	(+)	(++)	(++)	(++)	(++)
334	25.	"	(-)	(+)	(+)	(++)	(++)	(++)	(-)	(+)	(++)	(++)	(++)	(++)
335	26.	"	(-)	(±)	(±)	(+)	(++)	(++)	(-)	(±)	(+)	(++)	(++)	(++)
336	27.	"	(±)	(+)	(++)	(++)	(++)	(++)	(-)	(±)	(+)	(++)	(++)	(++)
337	28.	"	(-)	(±)	(+)	(+)	(++)	(++)	(-)	(±)	(+)	(++)	(++)	(++)
338	29.	"	(±)	(+)	(++)	(++)	(++)	(++)	(-)	(+)	(++)	(++)	(++)	(++)
339	30.	"	(-)	(±)	(±)	(+)	(+)	(+)	(-)	(±)	(+)	(++)	(++)	(++)
340	1.	V	(-)	(-)	(±)	(±)	(+)	(+)	(-)	(-)	(±)	(+)	(++)	(++)
341	2.	"	(-)	(-)	(±)	(+)	(+)	(+)	(-)	(±)	(+)	(++)	(++)	(++)
342	3.	"	(-)	(±)	(+)	(++)	(++)	(++)	(-)	(±)	(+)	(++)	(++)	(++)
343	4.	"	(-)	(±)	(+)	(++)	(++)	(++)	(±)	(+)	(++)	(++)	(++)	(++)
344	5.	"	(±)	(+)	(++)	(++)	(++)	(++)	(-)	(±)	(+)	(++)	(++)	(++)
345	6.	"	(-)	(±)	(+)	(++)	(++)	(++)	(-)	(+)	(++)	(++)	(++)	(++)
346	7.	"	(-)	(±)	(+)	(+)	(++)	(++)	(-)	(±)	(+)	(++)	(++)	(++)
347	8.	"	(-)	(±)	(+)	(+)	(++)	(++)	(-)	(±)	(+)	(++)	(++)	(++)

2nd menstruation

3rd menstruation

Age of child (Days)	Date	A r a k a w a's reaction											
		Right						Left					
		(0')	(1')	(2')	(3')	(4')	(5')	(0')	(1')	(2')	(3')	(4')	(5')
348	9. V	(-)	(±)	(+)	(+)	(H)	(H)	(-)	(±)	(±)	(+)	(+)	(H)
349	10. „	(-)	(±)	(±)	(+)	(+)	(+)	(-)	(±)	(±)	(+)	(+)	(+)
350	11. „	(-)	(-)	(±)	(±)	(+)	(H)	(-)	(-)	(±)	(+)	(+)	(H)
351	12. „	(-)	(±)	(+)	(+)	(+)	(+)	(-)	(±)	(+)	(+)	(+)	(H)
352	13. „	(-)	(-)	(±)	(±)	(±)	(+)	(-)	(±)	(+)	(+)	(+)	(+)
353	14. „	(-)	(±)	(±)	(+)	(+)	(H)	(-)	(-)	(-)	(±)	(±)	(±)
354	15. „	(-)	(-)	(-)	(±)	(+)	(+)	(-)	(-)	(-)	(±)	(±)	(±)
355	16. „	(-)	(-)	(±)	(±)	(+)	(+)	(-)	(-)	(±)	(±)	(+)	(+)
356	17. „	(-)	(±)	(±)	(+)	(+)	(H)	(-)	(±)	(+)	(+)	(H)	(H)
357	18. „	(-)	(-)	(±)	(+)	(+)	(+)	(-)	(-)	(+)	(+)	(+)	(H)
358	19. „	(-)	(±)	(+)	(+)	(H)	(H)	(-)	(±)	(+)	(+)	(+)	(H)
359	20. „	(-)	(±)	(±)	(+)	(+)	(+)	(-)	(-)	(+)	(+)	(+)	(+)
360	21. „	(-)	(-)	(±)	(±)	(+)	(+)	(-)	(-)	(-)	(±)	(+)	(+)
361	22. „	(-)	(-)	(±)	(±)	(+)	(+)	(-)	(-)	(-)	(±)	(+)	(+)
362	23. „	(-)	(-)	(-)	(±)	(±)	(±)	(-)	(±)	(+)	(+)	(+)	(H)
363	24. „	(-)	(±)	(±)	(±)	(±)	(+)	(-)	(±)	(±)	(±)	(+)	(+)
364	25. „	(-)	(-)	(-)	(±)	(±)	(±)	(-)	(±)	(±)	(+)	(+)	(+)
365	26. „	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(±)	(±)	(+)
366	27. „	(-)	(±)	(±)	(±)	(+)	(+)	(-)	(-)	(+)	(+)	(+)	(H)

on less different in reaction each day, very probably due to a slight general or local cause. However one can see, by glancing over Table II, and by paying special attention to the last part of the Table, that Arakawa's reaction in a healthy case is fairly constant every day. I shall observe the whole course by dividing it into 4 periods.

(a) Colostrum (1st-12th day) and Transition (12th-30th day).

The lactant, a primipara, secreted abundant milk, though a sufficient amount for Arakawa's reaction could not be collected during the first four days. From the 5th day the reaction was examined every day. Colostric and transitional milks were slightly weaker in reaction, in comparison with milks in the later stage.

(b) Early Mature Period (1-4 months).

The reaction in this period was on most days strong in both breasts, even though a very weak reaction occurred in a few instances (36th and 37th days, left and 74th day, right). Both breasts produced in general a good milk on most days.

(c) Middle Mature Period (4-9 months).

In this period Arakawa's reaction was generally good, specially on the left side and fairly constant. And no very weak reaction occurred on either side during the whole period. But from the 8th month on, Arakawa's reaction began to fluctuate. The first menses took place in this period, of which I shall relate later.

The infant remained healthy, though dentition began and a grip-pal fever continued for a few days, in the 7th month.

(d) Late Milk (10-12 months).

The fluctuation of the Arakawa reaction was more remarkable in this period than in the last month of the previous period, though the weak reaction became stronger in the eleventh month. But later the reaction in general became weaker and weaker, so that during the whole twelfth month a strong reaction did not happen even on a single day. In a word, Arakawa's reaction was negative in the twelfth month. The 2nd and 3rd menses occurred during this period, and about the time of the 3rd menses the infant suffered from infantile diarrhoea. Cow's milk was given to the sick infant instead of the Arakawa-negative milk, so that the mother's milk became less and less abundant in amount. The absolute weaning took place on the 361st day after birth. Mother's milk obtained 10 days after the absolute weaning was yellow, like colostric milk and remained negative to Arakawa's reaction as long as 15 minutes.

2. *Seasons and Arakawa's Reaction.*

The whole course was subject to different factors in different periods, but if we want to know the seasonal change of the whole course of Arakawa's reaction, we find that the reaction was good in summer and autumn. From our daily experience Arakawa's reaction seems to be strong especially in the summer, and so the fact that the milk in the mature period was good may partly have been due to the seasonal influence.

3. *Menses and Arakawa's Reaction.*

As to the relation between Arakawa's reaction and menses, Matsuda⁹⁾ states that the reaction will become weak or negative during the menses in 38.0% cases.

During the whole one year of my case, three menses occurred as stated above (Cf. Table II). The first, and possibly the 2nd menses, does not seem to have exerted a special influence on Arakawa's reaction, while the third menses did, I believe, have an effect on the reaction, especially because the infant suffered from infantile diarrhoea at this time. A substitution of cow's milk cured the disease. It would

9) F. Matsuda, *Jika Zasshi*, 1932, No. 371, 609.

have been much more instructive, if the amount of methylglyoxal-like substance in the milk had been determined in such instances. At any rate, it is probable that human milk can be poisonous at the time of the menses.

4. *Curve of Growth of Infant and Arakawa's Reaction.*

A number of factors should be taken to account, if the curve of growth is to be considered. But if only the relation between the Arakawa's reaction and the curve of growth is shown by way of a diagram, the steepest part of the curve of growth falls in the period in which Arakawa's reaction was strong and constant (Cf. Figure).

Fig. 1. Curve of growth of infant and constancy of Arakawa's reaction.

5. *Vitamin B Administration and Arakawa's Reaction.*

The relation between Arakawa's reaction and vitamin B has been repeatedly shown (Cf. Arakawa,¹⁰⁾ Takamatsu,¹¹⁾ above all).

It was stated above that various factors must have been exerting some influence or other on the whole course of the Arakawa's reac-

10) T. Arakawa, Tohoku J. Exp. Med., 1930, 16, 109-122.

11) A. Takamatsu, Tohoku J. Exp. Med., 1934, 23, 46.

tion of my cases. Besides the different factors above discussed, among others one thing very important is the supply of vitamin B.

The first administration of vitamin B in my case took place some time before the birth and continued as late as the 16th day after birth. 3 grms. of Beriberol powder was given per day. The second supply occurred on the 26th day and continued one week long: 3 grms. of Spelzon was given per day. The influence of the first administration of the vitamin does not seem to have been remarkable, but it is not difficult to suppose that it helped not to make Arakawa's reaction worse, because colostrum milk, according to our daily experience, is more prone to negative reaction. The second supply had a somewhat definite influence, as will be seen from Table II. But when vitamin B was administered for the third time, in the form of liquid Spelzon, it was unable to influence Arakawa's reaction to any degree, though the amount used was 15-20 grms. per day and continued for about 10 days, to restore Arakawa's reaction to normal in such a case, it must have been necessary to take such a measure as described in Takamatsu's¹²⁾ report;—a combined use of vitamin B and yakriton.

REMARKS.

Arakawa's reaction of a mother of a healthy baby was examined throughout nearly a whole year and the influences of various factors on the reaction were discussed. But the most important conclusion to be derived from such a long-timed observation is the constancy or reliability of Arakawa's reaction. If the result of only a few days, the reaction, for instance, 30. VI.-3. VII. (Table II) or of 5. VIII.-9. VII. (Table II), is seen, then it may appear as a rather capricious reaction, but if the result of a longer time, say from 30. X to till 9. XI, or from 16. XI till 38. XII, is seen, then the reaction is fairly constant or shows a somewhat regular propensity. As for various types of Arakawa's reaction of a short-timed period, Prof. Sato and Moriwaki will report in the near future.

CONCLUSIONS.

The most important conclusion to be derived from such a long-time observation is the constancy or reliability of Arakawa's reaction.

12) A. Takamatsu, *Tohoku J. Exp. Med.*, 1934, 23, 372.