

The Finger Type of the Japanese Macaques —A Roentgenographic Study—

by

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Abstract

A roentgenographic study was performed on the finger type of the Japanese macaques (*Macaca fuscata*) from five different regions. There were generally recognized remarkable local and sex differences in the absolute value of the measurement. In some indexes calculated, however, these differences were rather slight, and the degree of such differences varies in bones. The finger formula of Japanese macaques is II<IV formula in all cases examined, and the finger pattern index is larger than that of man. The IV-finger as well as the II-finger are considered to have influence on the finger pattern index of Japanese macaques. The relative length of the II-finger to the III-finger is undoubtedly larger in man, than in the Japanese macaques. This due to the fact that the phalanges, especially the distal one, are larger in man than in the Japanese macaques.

Introduction

The characteristics of the external appearance of the human fingers have been expressed by the finger formula, which has been classified into three groups: (1) II<IV formula; II-finger is less projecting than IV-finger, (2) II>IV formula; II-finger is more projecting than IV-finger, (3) II=IV formula; intermediate form.

According to the previous studies, the frequencies and the sex difference of these formulae vary in races. PHELPS (1952) maintained that the finger formula depend chiefly on the length of the II-finger, and that the gene for a short index finger determines the latter. On the other hand, KIMURA (1965), who considered in his roentgenographic study the finger formulae of man to be continuous mass, asserted that the IV-finger should also be taken into account as the II-finger.

In order to investigate the functional development of the human hand from the comparative anatomical point of view, statistical data about non-human primates are needed. As regards non-human primates, however, the interspecific comparison has been performed only on the basis of the scanty data obtained from measurements of a few bones or somatometry. The statistical data which allow the consideration about individual or regional difference in one species have not

been reported, too.

The present research was undertaken in an attempt to know the regional difference in the fingers of the Japanese macaques. Some considerations about the factors which have influence on the finger formula were also performed.

Material and Method

167 Japanese macaques from five different regions were used in this study (Fig. 1). Takasakiyama, Mihara, Iwatayama, and Shodoshima troops are natural troops. The monkeys which are kept at Japan Monkey Centre (J.M.C.), and those of Ohirayama troop, were once captured in Yakushima Island. The monkeys living on this island are classified as a subspecies (*Macaca fuscata yakui*) and discriminated from the *Macaca fuscata fuscata*.



Fig. 1 Localities of materials.

The numbers of the material are shown in Table 1.

The animals were anesthetized, and were laid on prone position, the arm and fingers stretching in a straight line, and the palms were put on the kassettes. Irradiations were performed from one meter height above the films.

The measurement items and the indexes calculated are shown below.

1. The length of each metacarpus and phalanx.
2. The total length of metacarpus and phalanges in each finger.

3. The breadth of each metacarpus and phalanx.
4. The length-breadth index.
5. The ratio of the length of each bone, and the total length of the I-, II-, IV-, and V-finger, to the total length of the III-finger.
6. The ratio of the difference from the apex of the III-finger to the apex of each bone of the II-, IV- and V-finger, to the total length of the phalanges of the III-finger (the recession index) (Fig. 2).
7. The ratio of the difference from the II-finger apex to the IV-finger apex (IV-II) to the total length of the phalanges of the III-finger (the finger pattern index) (Fig. 2).

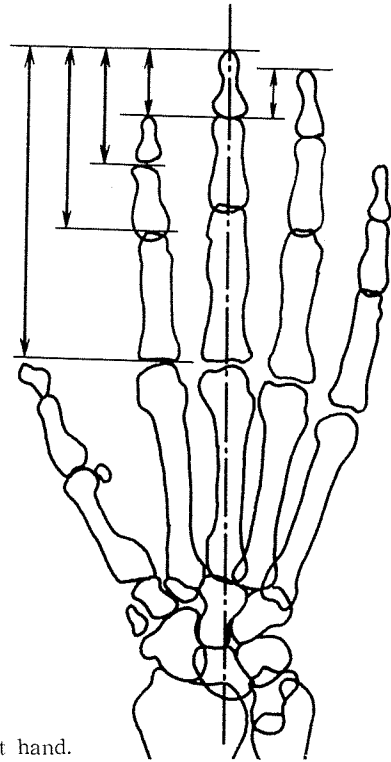


Fig. 2 Radiographic figure of right hand.

Table 1. Number of materials.

	Males	Females	Total
Takasakiyama (Oita Prefecture)	10	18	28
Mihara (Hiroshima Prefecture)	1	15	16
Iwatayama (Kyoto prefecture)	2	11	13
Shodoshima (Kagawa Prefecture)	24	24	48
Yakushima (Kagoshima Prefecture) Total	24	38	62
Care at the Japan Monkey Centre	13	26	39
Ohirayama	11	12	23
Total	61	106	167

The measurements were performed on the roentgenographs of right hands.

Since the males in Mihara and Iwatayama troops are small in number, they were not taken into consideration when the average values were compared.

Results and Discussion

1. The absolute value.

In both males and females, the absolute value of each bone is larger in Takasakiyama, Mihara and Iwatayama than in Shodoshima and Yakushima. The sex difference is marked. The males of Shodoshima and Yakushima are nearly equal in the absolute value of each bone to the female of other troops. The differences of the total length of metacarpus and phalanges among the troops are shown in Fig. 4.

2. The length-breadth index.

The average values of the length-breadth index are not so different among the troops as those of the absolute measurements. The values of the II- middle, III-proximal, IV-proximal phalanx, and the V-metacarpus and distal phalanx of the females of Shodoshima and Yakushima are larger than those of the females of other three troops (in general, $P < 0.05$), though the latter exceed in the value of the first metacarpus.

The length-breadth index of the I-proximal phalanx of the males of Yakushima is smaller than that of the males of Takasakiyama and Shodoshima.

3. The relative length and the relative total length.

In the females of the Shodoshima troop, the relative length of the metacarpus and proximal phalanx of every finger tend to be larger, and the values of the middle and distal phalanges smaller, than in the females of other troops (Fig.3). In relative total length of metacarpus-phalanges, the I-finger of Shodoshima exceeds that of the others, and the differences between Shodoshima and the others except Mihara are significant. The relative total length of the II-finger is smaller in Yakushima than in the other troops.

The males of the Shodoshima troop shows also somewhat larger average in the relative total length than the males of the Takasakiyama and Yakushima, but these difference are not significant ($P < 0.05$).

4. The recession index.

In females, the average of the II-distal phalanx in Yakushima, and the V-distal phalanx in Shodoshima is larger than each value in the other troops, and in most of these is a significant difference. In males, the recession index of each metacarpus and phalanx of the V-finger is smaller in Yakushima than in the other troops, and the difference is significant. Moreover, the value of the IV-distal phalanx in the males of Takasakiyama exceeds that of the others.

The recession index of the IV-metacarpus is larger than that of the II-, but the index of the IV-proximal phalanx is smaller than that of the II-. In the middle and distal phalanx such difference of the recession index between the II-

and the IV-finger is much more marked (Fig. 5). This is due to the fact that each phalanx of the II-finger is shorter than that of the IV-.

5. The finger pattern index.

The finger formula of Japanese macaques is II<IV formula, and the finger pattern index is positive.

The females of the Yakushima show larger values than the females of the others, and the difference between Yakushima and Mihara troops is significant. In males the value of Takasakiyama is smaller than that of Shodoshima and Yakushima.

In order to know which the II- or IV-finger is more closely related to the finger pattern index, the correlation between the finger pattern index and the recession index was investigated. In both the II- and the IV-fingers there was recognized a close correlation between the finger pattern index and the recession index of the distal phalanx. Such correlation was also found in lesser degree in the middle and the proximal phalanx and the metacarpus (Fig. 6). In the Japanese macaques, therefore, the finger pattern index is influenced by the IV-finger as well as the II-finger.

The average of the recession index of the II-distal phalanx in the females of the Yakushima is larger than that of the females of the other troops, while the value of the IV-distal phalanx is only slightly different from that of the others. The finger pattern index of the females of Yakushima is larger than that of the other troops. This might be due to the fact that the recession index of the II-finger is larger in the females of Yakushima than in the other troops. In the males of Takasakiyama troop, which show the smallest finger pattern index, the recession index is smaller in the II-finger, but larger in the IV- than in the males of the other troops.

6. Comparison with man.

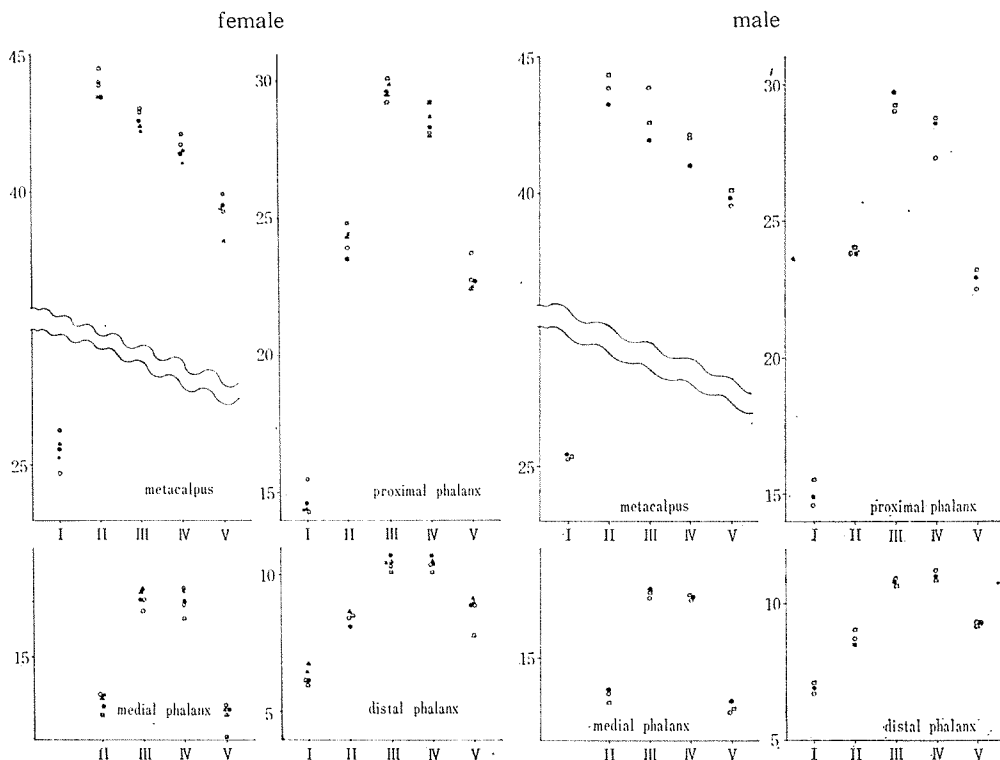
Compared with man (cf. KIMURA 1965), in the Japanese macaques, the finger pattern index and the recession index of the II-distal phalanx are larger, but the recession index of the IV-distal phalanx is smaller. This indicates that, while the II-finger projects more marked in man, the IV-finger is more prominent in Japanese macaques. Therefore, the difference between the apexes of the two fingers is not remarkable in man.

The relative length of the metacarpus of the II- and the IV-fingers to the III-finger (metacarpus+phalanges) is larger in monkey than in man. But the relative total length of the II-finger to the III-finger is longer in man, since the phalanges, especially the distal one, are longer in man. In the IV-finger, however, as the relative length of phalanges are nearly equal, the relative total length is shorter in man (Fig. 7). This lengthening of the II-distal phalanx in man might have some relations to the functional development of human hand.

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Fig. 3 Relative length to the total length of III- metacarpus-phalanges.



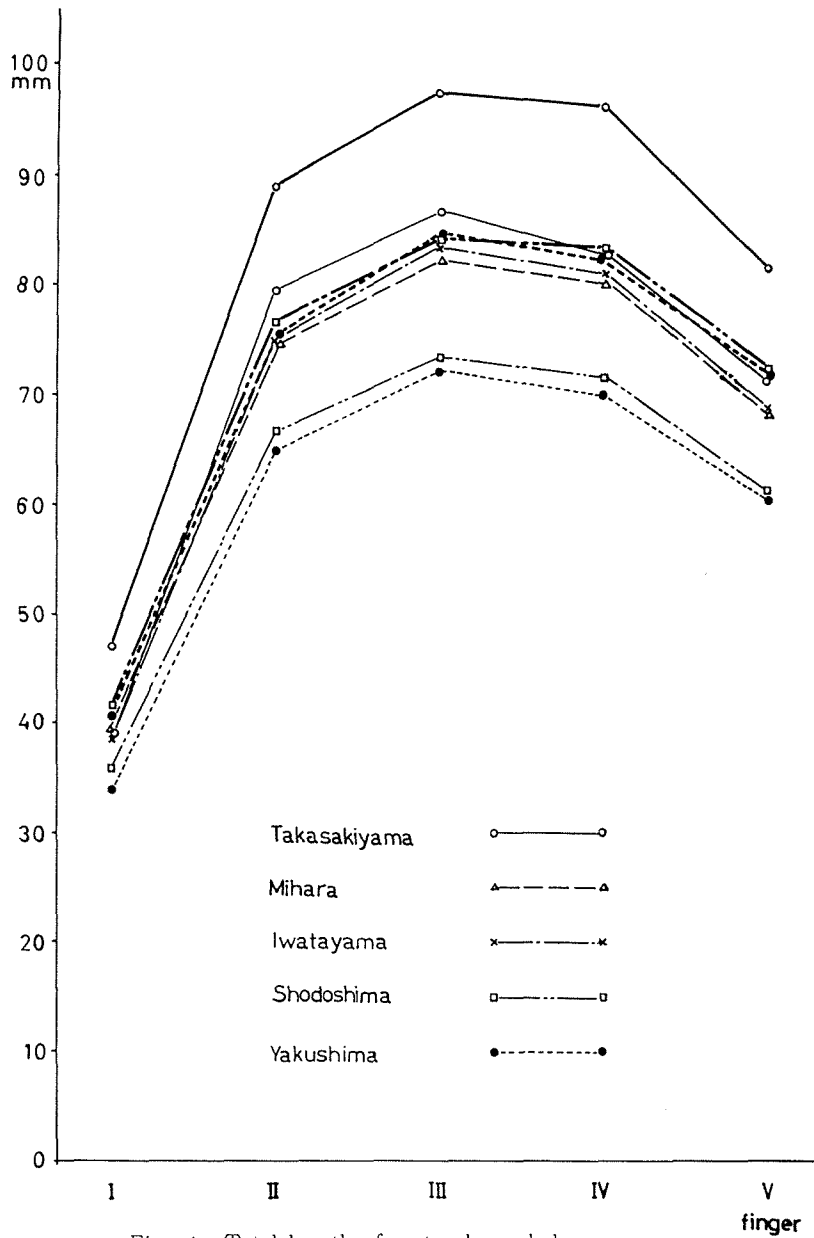


Fig. 4 Total length of metacarpus-phalanges.
(thick line; male, thin line; female)

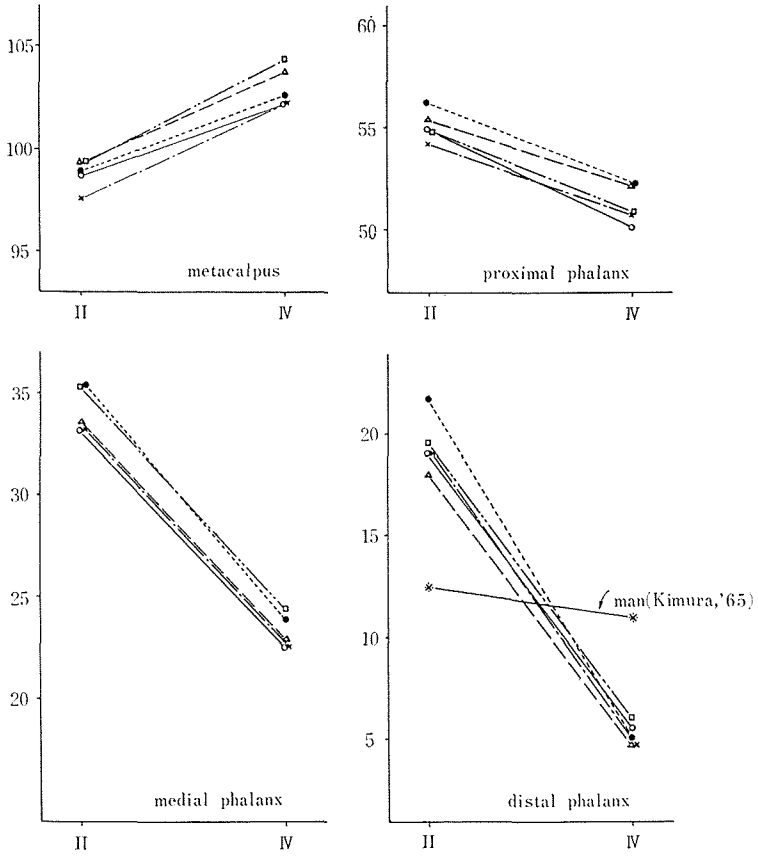


Fig. 5-a Recession index of II- and IV- finger. (female)

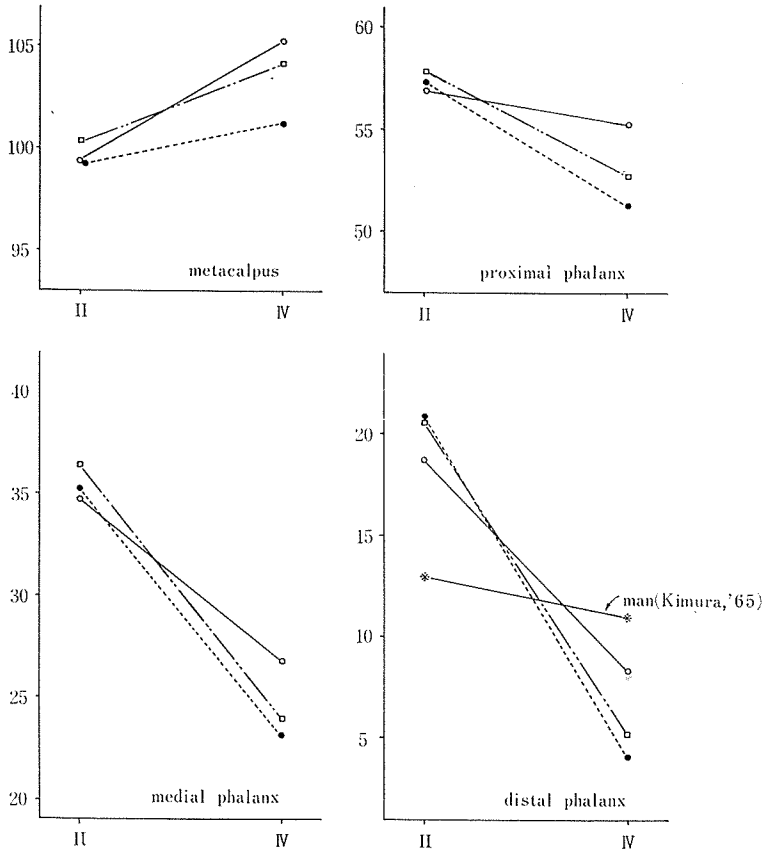


Fig. 5-b Recession index of II-and IV- finger. (male)

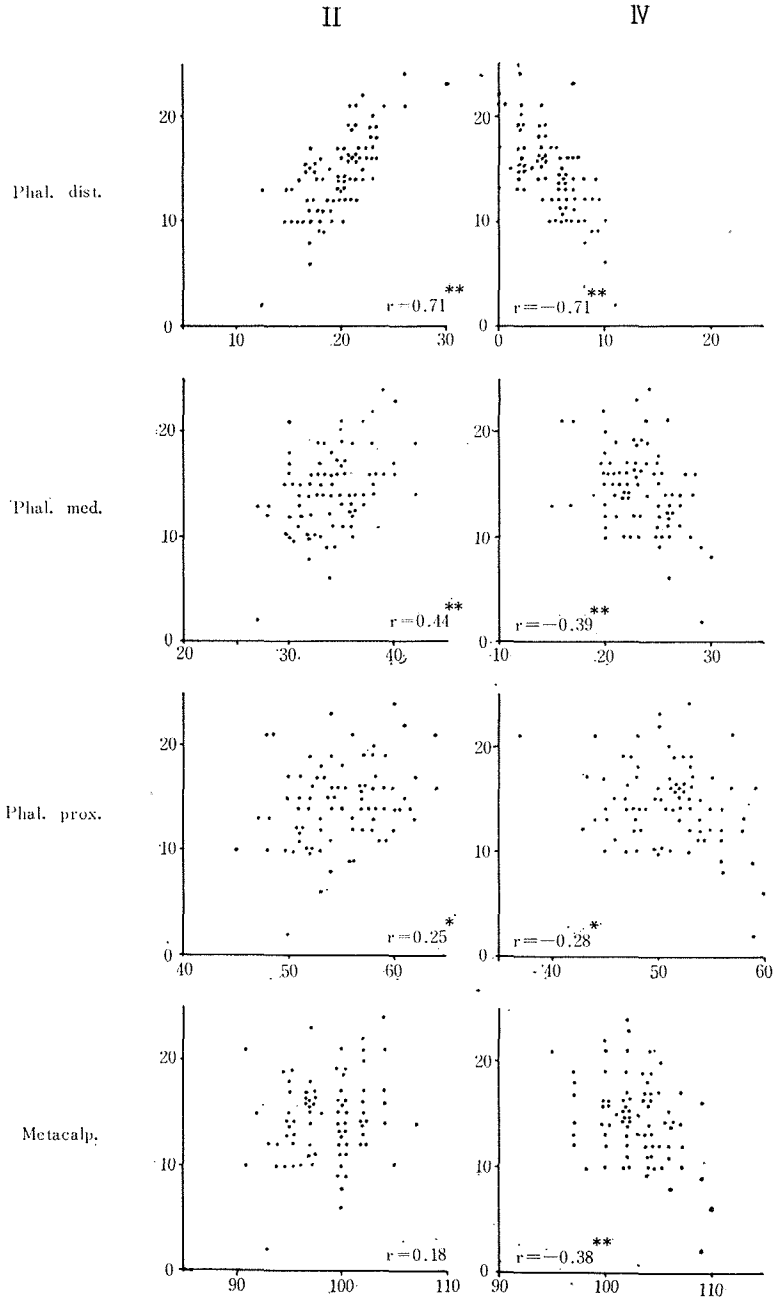


Fig. 6-a Correlation between the finger pattern index (ordinate) and the recession index (abscissa). (female)

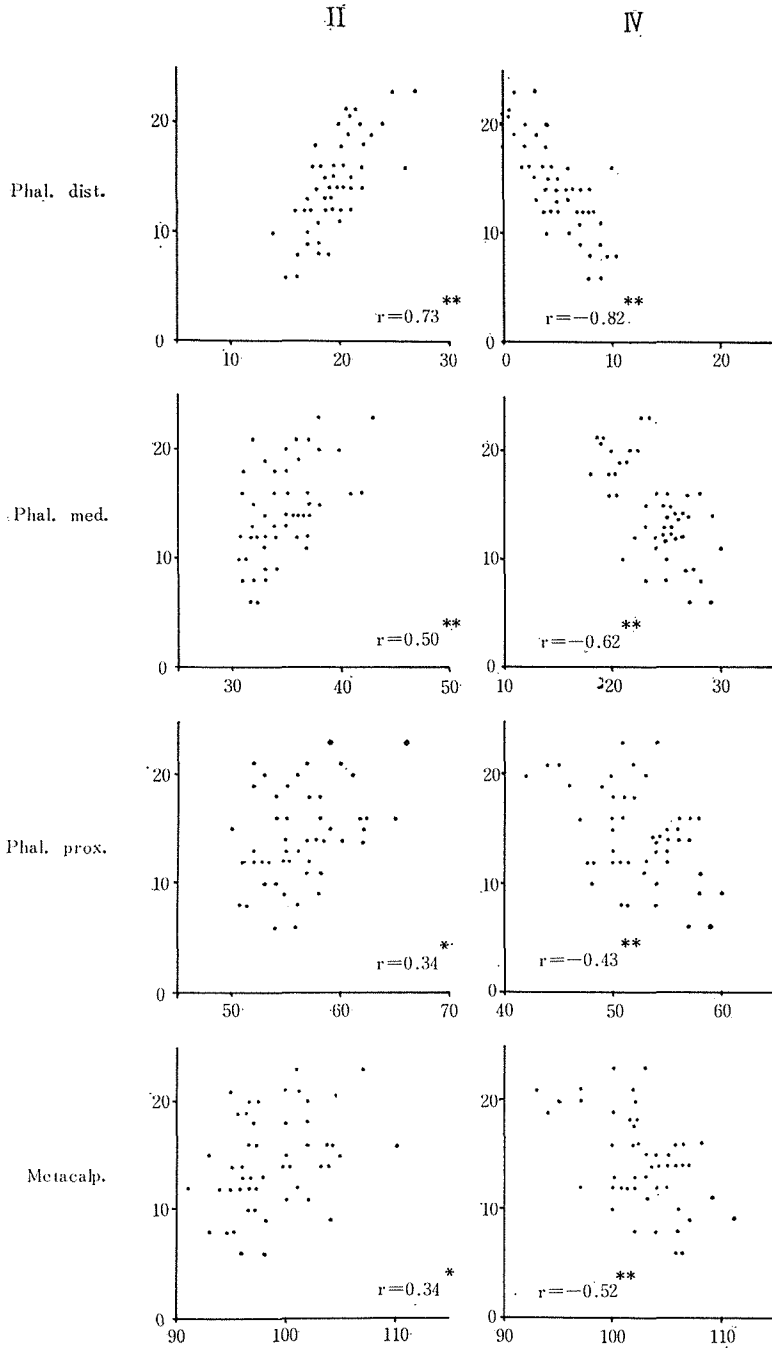


Fig. 6-b Correlation between the finger pattern index (ordinate) and the recession index (abscissa). (male)

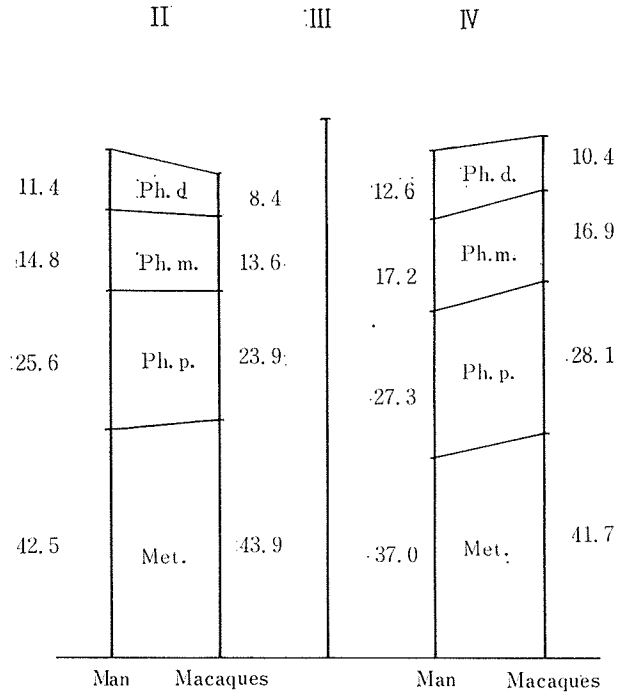


Fig. 7 Comparison of the relative length of the metacarpus and the phalanges in the II- and IV-finger to the total length in the III-finger, between man (cf. KIMURA 1965) and Japanese macaque (Takasakiyama troop). (female)

Table 2-a Length (female) (mm)

		Takasakiyama			Mihara			Iwatayama			Shodoshima			Yakushima		
		n	\bar{x}	σ^2	n	\bar{x}	σ^2	n	\bar{x}	σ^2	n	\bar{x}	σ^2	n	\bar{x}	σ^2
I	Metacalp.	18	21.3	0.88	15	21.9	1.44	11	21.5	0.26	23	19.7	0.60	37	18.9	0.83
	Phal. prox.	17	12.6	0.69	15	12.5	0.67	11	12.5	0.36	23	11.8	0.55	37	11.0	0.41
	dist.	14	5.9	0.39	14	6.2	0.35	10	5.8	0.41	19	5.0	0.56	37	4.9	0.27
	Total	14	39.1	2.94	14	39.5	5.50	10	38.6	2.09	19	35.7	1.87	37	33.9	2.61
II	Metacalp.	18	37.7	1.42	15	36.6	1.72	11	36.5	1.36	23	32.9	2.07	37	31.7	1.45
	Phal. prox.	18	20.7	0.62	15	20.5	0.93	11	20.7	0.20	24	18.5	0.99	37	17.4	0.47
	med.	17	12.0	1.07	12	11.6	0.31	11	11.5	1.54	22	10.0	1.25	37	9.9	0.78
	dist.	17	7.6	0.22	12	7.7	0.19	11	7.4	0.63	23	6.7	0.62	37	6.2	0.50
Total	17	79.7	5.94	11	75.0	6.43	11	75.2	7.47	21	66.8	7.55	37	65.0	5.86	
III	Metacalp.	18	37.0	2.14	15	35.5	1.60	11	35.5	0.81	23	31.8	1.16	37	31.1	1.25
	Phal. prox.	18	25.2	0.95	15	24.7	1.26	11	25.2	0.56	23	22.6	0.49	37	21.7	0.56
	med.	17	15.1	1.40	12	14.9	1.24	10	15.1	1.64	22	12.8	2.85	37	12.7	1.44
	dist.	15	9.3	0.16	12	9.1	0.39	10	9.1	1.04	23	7.9	0.85	35	8.2	0.43
Total	15	85.2	8.33	11	82.4	9.17	10	83.8	6.61	21	73.6	7.64	35	72.3	6.48	
IV	Metacalp.	18	36.0	1.47	15	34.7	0.96	11	34.5	1.45	23	31.2	1.23	37	30.1	1.09
	Phal. prox.	18	24.3	0.47	12	23.6	1.31	11	24.0	0.61	24	21.9	0.82	36	20.8	0.50
	med.	17	14.7	0.80	12	14.8	0.72	10	15.0	0.65	23	12.5	1.91	36	12.6	0.87
	dist.	16	9.4	0.18	12	9.0	0.58	10	9.3	0.56	23	8.0	0.42	37	8.2	0.42
Total	16	83.0	4.37	11	80.4	8.45	10	81.4	4.49	21	72.0	6.34	36	70.3	5.43	
V	Metacalp.	18	33.8	1.11	15	32.7	1.36	10	32.3	0.56	23	29.6	0.98	37	28.9	1.37
	Phal. prox.	18	19.8	0.58	15	19.1	0.76	11	19.1	0.60	24	17.7	0.62	37	16.7	0.58
	med.	17	11.7	0.65	15	10.9	0.52	11	11.3	1.24	23	9.5	1.39	36	9.8	0.79
	dist.	17	7.9	0.72	14	7.9	0.53	11	8.0	0.43	22	6.2	0.90	37	6.9	0.29
Total	17	71.9	6.71	14	68.9	6.82	10	69.4	5.89	20	61.7	6.46	36	61.0	6.58	

Table 2-b Length (male) (mm)

		Takasakiyama			Shodoshima			Yakushima		
		n	\bar{x}	σ^2	n	\bar{x}	σ^2	n	\bar{x}	σ^2
I	Metacalp.	8	25.3	2.61	24	21.5	2.49	22	21.9	0.88
	Phal. prox.	7	15.0	0.53	24	13.6	0.63	21	13.1	0.38
	dist.	4	7.2	0.19	23	6.3	0.46	22	6.2	0.53
	Total	4	47.0	7.25	23	41.5	4.91	21	40.3	2.98
II	Metacalp.	9	43.6	2.77	24	37.7	4.16	23	37.0	1.81
	Phal. prox.	9	23.9	2.25	24	20.6	0.72	23	20.5	1.13
	med.	9	13.8	1.11	24	11.7	1.12	23	12.0	0.59
	dist.	9	9.2	0.62	23	8.0	0.59	22	7.6	0.60
Total	9	89.1	19.11	23	76.7	10.69	22	75.6	7.42	
III	Metacalp.	9	42.6	3.21	24	36.6	3.80	23	35.8	2.29
	Phal. prox.	9	28.6	2.32	24	25.0	0.74	23	25.4	1.55
	med.	9	17.5	3.56	23	15.0	2.24	23	15.2	1.38
	dist.	8	10.8	1.23	23	9.5	0.73	23	9.7	0.77
Total	8	97.8	32.98	23	84.5	12.56	23	84.7	11.12	
IV	Metacalp.	9	41.5	3.11	24	35.8	2.06	22	35.1	2.15
	Phal. prox.	9	27.3	2.54	24	24.5	1.24	21	24.5	1.04
	med.	9	17.1	2.67	24	15.0	2.16	23	15.0	1.20
	dist.	8	11.2	0.69	23	9.7	0.69	23	9.8	0.83
Total	8	96.6	16.86	23	83.7	12.51	21	83.0	11.86	
V	Metacalp.	8	38.5	2.25	24	34.2	2.54	23	33.9	2.68
	Phal. prox.	8	22.3	2.86	24	20.2	1.37	22	19.8	0.85
	med.	8	13.2	1.69	24	11.5	1.29	22	11.8	0.94
	dist.	8	9.3	0.35	23	8.2	0.69	23	8.3	0.54
Total	8	82.0	20.50	23	72.9	12.51	22	72.5	12.90	

Table 3-a Breadth (female) (mm)

		Takasakiyama			Mihara			Iwatayama			Shodoshima			Yakushima		
		n	\bar{x}	σ^2	n	\bar{x}	σ^2	n	\bar{x}	σ^2	n	\bar{x}	σ^2	n	\bar{x}	σ^2
I	Metacalp.	18	3.2	0.17	13	3.4	0.07	11	3.4	0.08	23	2.9	0.24	37	2.5	0.05
	Phal. prox.	16	2.8	0.23	13	3.2	0.18	11	3.1	0.23	23	2.6	0.23	37	2.4	0.10
	dist.	14	1.8	0.23	12	1.7	0.19	10	1.7	0.16	18	1.5	0.00	37	1.5	0.05
II	Metaealp.	18	4.0	0.25	15	4.2	0.20	11	4.2	0.20	24	3.5	0.07	37	3.5	0.02
	Phal. prox.	18	4.4	0.05	15	4.2	0.20	11	4.4	0.08	24	4.3	0.16	37	3.6	0.13
	med.	18	3.5	0.00	13	3.5	0.00	11	3.5	0.08	23	3.5	0.17	37	3.4	0.09
	dist.	18	1.5	0.00	14	1.7	0.17	10	1.5	0.00	22	1.5	0.04	37	1.5	0.00
III	Metacalp.	18	4.5	0.11	15	4.6	0.12	11	4.5	0.08	24	3.9	0.24	37	3.9	0.24
	Phal. prox.	18	4.7	0.20	15	4.5	0.06	11	4.6	0.15	24	4.5	0.04	37	4.4	0.05
	med.	18	4.2	0.20	13	4.0	0.25	10	4.2	0.21	23	3.6	0.20	37	3.5	0.05
	dist.	17	2.2	0.18	14	2.0	0.25	10	2.1	0.24	23	1.7	0.17	36	1.8	0.23
IV	Metacalp.	18	4.4	0.05	15	4.3	0.16	11	4.3	0.15	24	3.7	0.33	37	3.5	0.00
	Phal. prox.	18	4.4	0.16	13	4.2	0.18	11	4.5	0.00	24	4.2	0.18	37	4.1	0.21
	med.	18	3.9	0.25	12	3.9	0.24	11	4.0	0.25	23	3.5	0.21	37	3.4	0.02
	dist.	17	1.9	0.24	13	1.9	0.25	10	2.1	0.24	23	1.5	0.04	37	1.6	0.09
V	Metacalp.	18	3.5	0.05	15	3.5	0.00	10	3.5	0.00	24	3.1	0.22	37	2.9	0.24
	Phal. prox.	18	3.8	0.24	15	3.7	0.16	11	3.7	0.20	24	3.5	0.24	37	3.5	0.00
	med.	18	3.5	0.00	15	3.5	0.00	11	3.5	0.00	24	2.9	0.24	37	3.1	0.24
	dist.	18	1.5	0.05	15	1.5	0.00	11	1.5	0.00	21	1.5	0.00	37	1.5	0.00

Table 3-b Breadth (male) (mm)

		Takasakiyama			Shodoshima			Yakushima		
		n	\bar{x}	σ^2	n	\bar{x}	σ^2	n	\bar{x}	σ^2
I	Metacalp.	8	3.8	0.23	24	3.6	0.47	24	3.1	0.22
	Phal. prox.	7	3.7	0.20	24	3.3	0.16	24	2.5	0.19
	dist.	4	2.5	0.00	23	2.2	0.21	24	1.7	0.18
II	Metacalp.	9	4.7	0.17	24	4.2	0.20	24	4.0	0.25
	Phal. prox.	9	5.2	0.17	23	4.6	0.14	24	4.6	0.10
	med.	9	4.2	0.17	23	4.0	0.24	24	3.7	0.18
	dist.	9	2.3	0.10	22	2.1	0.23	23	2.0	0.24
III	Metacalp.	9	5.3	0.10	24	4.5	0.08	24	4.4	0.04
	Phal. prox.	9	5.7	0.17	24	5.1	0.23	24	5.4	0.07
	med.	9	4.7	0.17	23	4.5	0.17	24	4.4	0.04
	dist.	9	2.5	0.00	23	2.3	0.14	24	2.5	0.04
IV	Metacalp.	9	5.0	0.25	24	4.3	0.13	24	4.3	0.16
	Phal. prox.	9	5.2	0.17	24	4.6	0.13	24	4.8	0.40
	med.	9	4.5	0.00	24	4.1	0.23	24	4.1	0.22
	dist.	8	2.5	0.00	23	2.0	0.24	24	2.4	0.04
V	Metacalp.	9	4.1	0.22	24	3.5	0.07	24	3.5	0.00
	Phal. prox.	8	4.7	0.19	24	4.2	0.18	24	4.4	0.04
	med.	8	4.0	0.25	24	3.5	0.25	24	3.5	0.07
	dist.	8	2.1	0.23	23	1.8	0.23	24	1.7	0.20

Table 4-a Length-breadth index (female)

		Takasakiyama			Mihara			Iwatayama			Shodoshima			Yakushima		
		n	\bar{x}	σ^2	n	\bar{x}	σ^2	n	\bar{x}	σ^2	n	\bar{x}	σ^2	n	\bar{x}	σ^2
I	Metacalp.	18	13.3	3.77	13	13.9	1.63	11	13.9	2.25	23	12.8	5.77	37	11.3	2.40
	Phal. prox.	16	20.0	22.00	13	23.8	13.60	11	22.3	22.15	23	19.3	14.63	37	19.1	10.09
	dist.	14	25.3	76.12	12	22.4	43.91	10	23.1	57.74	18	23.0	16.02	37	24.5	63.59
II	Metacalp.	18	9.5	1.67	15	10.3	1.45	11	10.3	1.42	23	9.6	0.80	37	9.6	0.62
	Phal. prox.	18	20.0	1.81	15	19.0	5.32	11	19.7	2.02	24	21.2	6.70	37	18.6	5.17
	med.	17	26.5	5.11	12	27.2	1.69	11	28.5	15.54	22	32.1	24.59	37	31.0	14.67
	dist.	17	14.2	0.89	11	17.5	30.63	11	14.8	4.23	22	17.0	12.78	37	17.7	6.30
III	Metacalp.	18	11.0	1.58	15	11.8	1.02	11	11.6	0.88	23	11.0	2.07	37	11.3	2.09
	Phal. prox.	18	17.3	2.77	15	16.9	0.65	11	17.0	1.34	23	18.5	0.52	37	18.9	1.43
	med.	17	25.4	14.12	12	25.0	6.58	10	25.5	7.40	21	25.8	15.46	37	25.4	5.85
	dist.	15	20.0	25.98	12	17.3	28.56	10	18.5	28.20	22	15.6	17.24	35	17.6	33.91
IV	Metacalp.	18	11.1	0.57	15	11.0	0.91	11	11.3	1.97	23	10.5	4.42	37	10.3	0.44
	Phal. prox.	18	16.6	2.54	13	16.5	4.00	11	17.1	0.23	24	17.9	5.32	36	18.5	4.52
	med.	17	24.4	12.64	12	23.9	12.41	10	25.0	12.45	21	25.3	13.10	36	25.1	4.05
	dist.	16	16.5	34.18	12	17.0	42.58	10	18.3	23.36	23	13.9	4.59	37	14.6	22.40
V	Metacalp.	18	9.2	0.53	15	9.3	0.25	10	9.5	0.00	23	9.2	3.41	37	10.3	2.92
	Phal. prox.	18	17.8	7.00	15	17.2	5.66	11	17.5	4.36	23	17.1	2.66	37	18.4	1.75
	med.	17	27.2	3.62	15	29.1	4.09	11	28.4	7.90	22	27.0	20.06	36	27.9	26.69
	dist.	17	14.4	9.82	14	13.7	1.74	11	13.4	1.72	20	17.3	7.32	37	15.8	1.58

Table 4-b Length-breadth index (male)

		Takasakiyama			Shodoshima			Yakushima		
		n	\bar{x}	σ^2	n	\bar{x}	σ^2	n	\bar{x}	σ^2
I	Metacalp.	8	13.7	3.44	23	14.5	2.65	22	13.4	6.17
	Phal. prox.	7	22.7	6.49	24	21.5	9.16	21	16.7	13.80
	dist.	4	29.7	4.69	23	29.2	66.86	22	22.5	69.27
II	Metacalp.	9	9.8	0.67	24	10.0	1.49	23	9.8	1.69
	Phal. prox.	9	20.6	2.10	23	21.1	2.31	23	20.9	1.72
	med.	9	28.5	17.11	23	32.1	19.00	23	28.7	22.80
	dist.	9	21.9	14.69	22	22.2	31.26	22	21.2	55.08
III	Metacalp.	9	11.5	0.44	24	11.2	0.60	23	11.2	0.73
	Phal. prox.	9	18.7	2.62	24	19.0	3.41	23	19.9	1.72
	med.	9	25.3	14.98	23	27.8	21.27	23	27.0	7.81
	dist.	8	19.7	4.94	23	21.1	17.09	23	22.7	7.38
IV	Metacalp.	9	11.0	1.14	24	10.9	0.91	22	10.9	1.70
	Phal. prox.	9	17.8	1.78	24	17.4	2.12	21	18.1	4.90
	med.	9	24.5	6.44	24	25.0	9.57	23	25.3	14.72
	dist.	8	19.0	2.75	23	17.1	21.61	23	21.5	8.95
V	Metacalp.	8	9.6	1.36	24	9.1	0.80	23	9.0	0.33
	Phal. prox.	8	19.7	7.94	24	19.4	5.24	22	20.9	1.69
	med.	8	27.7	15.94	23	26.9	14.42	22	27.6	10.77
	dist.	8	20.0	28.00	23	17.9	33.03	23	16.5	24.65

Table 5-a Relative length to the total length of the third metacarpus-phalanges (female)

	Takasakiyama			Mihara			Iwatayama			Shodoshima			Yakushima		
	n	\bar{x}	σ^2	n	\bar{x}	σ^2	n	\bar{x}	σ^2	n	\bar{x}	σ^2	n	\bar{x}	σ^2
I Metacalp.	15	24.7	1.26	11	25.8	0.96	10	25.3	0.56	21	26.3	0.53	35	25.6	1.37
Phal. prox.	14	14.3	1.26	11	14.4	0.99	10	14.4	1.09	21	15.5	1.09	35	14.6	0.82
dist.	12	6.1	0.56	11	6.8	0.23	9	6.5	0.89	17	6.0	0.60	35	6.1	0.52
Total	12	45.6	2.97	11	46.9	4.07	9	45.8	4.67	17	48.2	1.26	35	46.3	3.70
II Metacalp.	15	43.9	2.12	11	44.0	2.07	10	43.5	1.40	21	44.5	5.90	35	43.5	1.97
Phal. prox.	15	23.9	0.50	11	24.3	1.06	10	24.4	0.49	21	24.8	1.84	35	23.5	0.57
med.	15	13.6	1.32	10	13.5	0.40	10	13.6	1.49	20	12.9	1.67	35	13.2	1.10
dist.	15	8.4	0.06	10	8.7	0.16	10	8.5	0.60	20	8.5	1.00	35	8.1	0.91
Total	15	89.9	2.92	10	90.5	3.00	10	89.7	3.76	20	90.7	6.38	35	88.4	2.68
III Metacalp.	15	42.9	2.37	11	42.4	0.99	10	42.2	1.41	21	42.9	3.19	35	42.6	1.35
Phal. prox.	15	29.2	0.46	11	29.5	0.36	10	29.9	0.44	21	30.1	0.88	35	29.6	0.55
med.	15	17.1	1.16	11	17.5	1.36	10	17.4	1.29	21	16.7	3.32	35	17.1	1.71
dist.	15	10.3	0.29	11	10.5	0.26	10	10.4	0.69	21	10.1	1.36	35	10.7	0.86
IV Metacalp.	15	41.7	2.69	11	41.5	1.09	10	41.1	2.04	21	42.1	4.90	35	41.4	1.31
Phal. prox.	15	28.1	0.37	11	28.0	0.98	10	28.7	0.96	21	29.2	1.51	34	28.3	0.71
med.	15	16.9	0.91	11	17.5	0.36	10	17.4	0.49	21	16.4	2.04	34	17.0	1.12
dist.	15	10.4	0.20	11	10.5	0.91	10	10.4	0.49	21	10.1	0.50	35	10.7	0.67
Total	15	97.2	2.20	11	97.6	5.06	10	97.2	1.81	21	97.8	4.03	34	97.6	3.16
V Metacalp.	15	39.3	1.23	11	39.4	1.90	9	38.2	2.62	21	39.9	3.00	35	39.5	0.99
Phal. prox.	15	22.7	1.09	11	22.4	0.63	10	22.5	0.80	21	23.7	1.51	35	22.7	0.74
med.	15	13.2	0.73	11	12.9	0.43	10	13.2	1.41	21	12.1	2.04	35	13.2	0.89
dist.	15	8.9	0.78	11	9.0	0.43	10	9.1	0.44	19	7.8	1.70	35	8.9	0.36
Total	15	83.7	4.73	11	83.7	4.38	9	83.5	3.33	19	83.9	5.29	35	84.2	3.26

Table 5-b Relative length to the total length of the third metacarpus-phalanges (male)

	Takasakiyama			Shodoshima			Yakushima		
	n	\bar{x}	σ^2	n	\bar{x}	σ^2	n	\bar{x}	σ^2
I Metacalp.	7	25.2	0.78	23	25.3	2.11	22	25.4	0.77
Phal. prox.	6	14.6	0.47	23	15.5	0.47	21	14.9	0.53
dist.	4	6.7	0.19	22	7.0	1.06	22	6.9	0.87
Total	4	46.7	0.69	22	47.9	4.61	21	47.3	2.31
II Metacalp.	8	43.8	1.48	23	44.3	4.72	23	43.2	1.56
Phal. prox.	8	23.8	0.73	23	24.0	0.94	23	23.8	0.74
med.	8	13.7	0.44	23	13.3	1.10	23	13.8	0.82
dist.	8	8.7	1.19	23	9.0	0.42	22	8.5	0.77
Total	8	90.5	2.50	23	90.7	3.12	22	89.3	3.20
III Metacalp.	8	43.8	3.98	23	42.6	2.83	23	41.9	1.02
Phal. prox.	8	29.0	0.75	23	29.2	0.60	23	29.7	0.88
med.	8	17.2	1.69	23	17.4	2.21	23	17.5	1.47
dist.	8	10.8	0.48	23	10.6	0.80	23	10.9	0.94
IV Metacalp.	8	42.1	0.98	23	42.0	2.85	22	41.0	0.79
Phal. prox.	8	27.3	0.73	23	28.7	1.47	21	28.6	0.78
med.	8	17.1	1.98	23	17.3	2.11	23	17.2	0.97
dist.	7	11.2	0.49	23	10.8	0.73	23	11.0	1.20
Total	7	97.0	0.82	23	99.0	3.37	21	97.8	3.07
V Metacalp.	7	39.5	1.71	23	40.1	1.36	23	39.8	0.74
Phal. prox.	7	22.5	1.14	23	23.2	1.95	22	22.9	0.70
med.	7	13.0	0.82	23	13.1	0.83	22	13.4	1.13
dist.	7	9.3	0.41	22	9.2	0.81	23	9.3	0.70
Total	7	84.0	14.53	22	86.0	5.06	22	85.5	5.54

Table 6-a Recession index (female)

	Takasakiyama			Mihara			Iwatayama			Shodoshima			Yakushima		
	n	\bar{x}	σ^2	n	\bar{x}	σ^2	n	\bar{x}	σ^2	n	\bar{x}	σ^2	n	\bar{x}	σ^2
II Metacalp.	14	98.7	11.74	10	99.4	5.09	9	97.6	14.10	20	99.4	11.44	34	98.9	11.88
Phal. prox.	14	55.0	13.96	10	55.5	17.20	9	54.3	13.65	20	54.9	21.24	34	56.3	14.92
med.	14	33.2	9.03	9	33.6	8.54	9	33.2	5.06	19	35.3	11.02	34	35.0	10.65
dist.	14	19.1	4.80	9	18.0	5.36	9	19.1	3.56	19	19.6	7.71	34	21.8	8.27
IV Metacalp.	14	102.2	4.60	10	103.7	11.16	8	102.2	9.19	21	104.3	8.88	32	102.6	11.25
Phal. prox.	14	50.2	8.59	10	52.3	16.56	8	50.8	17.23	21	50.9	25.96	32	52.3	19.63
med.	14	22.6	7.98	10	22.9	11.24	8	22.6	7.83	21	24.4	11.86	32	23.9	6.94
dist.	14	5.6	5.69	10	4.8	8.41	8	4.8	6.98	21	6.1	7.47	31	5.1	5.01
V Metacalp.	13	111.9	11.02	10	114.1	11.64	8	111.7	11.69	19	114.9	15.61	34	111.8	15.64
Phal. prox.	13	72.2	18.64	10	72.7	20.16	8	71.2	18.19	19	72.9	23.19	34	71.7	23.12
med.	13	51.6	32.75	10	51.3	24.16	8	50.1	17.73	19	54.2	15.00	34	50.7	16.84
dist.	13	36.8	35.44	10	34.7	11.56	8	33.7	12.94	18	40.2	18.97	34	34.8	17.68

Table 6-b Recession index (male)

	Takasakiyama			Shodoshima			Yakushima		
	n	\bar{x}	σ^2	n	\bar{x}	σ^2	n	\bar{x}	σ^2
II Metacalp.	8	99.3	12.11	21	100.3	24.15	23	99.2	9.51
Phal. prox.	8	56.8	14.73	21	57.8	19.09	23	57.2	10.97
med.	8	34.7	5.94	20	36.4	15.29	23	35.2	6.08
dist.	8	18.7	3.44	20	20.5	10.90	22	20.8	4.59
IV Metacalp.	8	105.2	8.14	21	104.1	9.46	22	101.1	14.03
Phal. prox.	8	55.2	13.69	21	52.7	18.49	22	51.2	16.14
med.	8	26.7	2.69	21	23.9	9.76	22	23.1	6.96
dist.	7	8.3	1.28	20	5.2	6.61	21	4.1	7.84
V Metacalp.	7	116.6	4.69	20	114.9	15.14	22	107.6	22.51
Phal. prox.	7	75.9	4.53	20	74.9	14.54	22	68.9	20.16
med.	7	56.5	4.86	19	53.9	15.93	21	47.6	18.44
dist.	7	40.2	8.20	17	37.9	19.77	21	31.1	18.90

Table 7 Finger pattern index

	Male			Female		
	n	\bar{x}	σ^2	n	\bar{x}	σ^2
Takasakiyama	7	10.3	8.71	14	14.0	5.25
Mihara				9	13.3	6.77
Iwatayama				8	14.6	7.61
Shodoshima	19	15.3	14.76	19	13.5	22.73
Yakushima	20	16.3	17.62	31	16.8	12.80

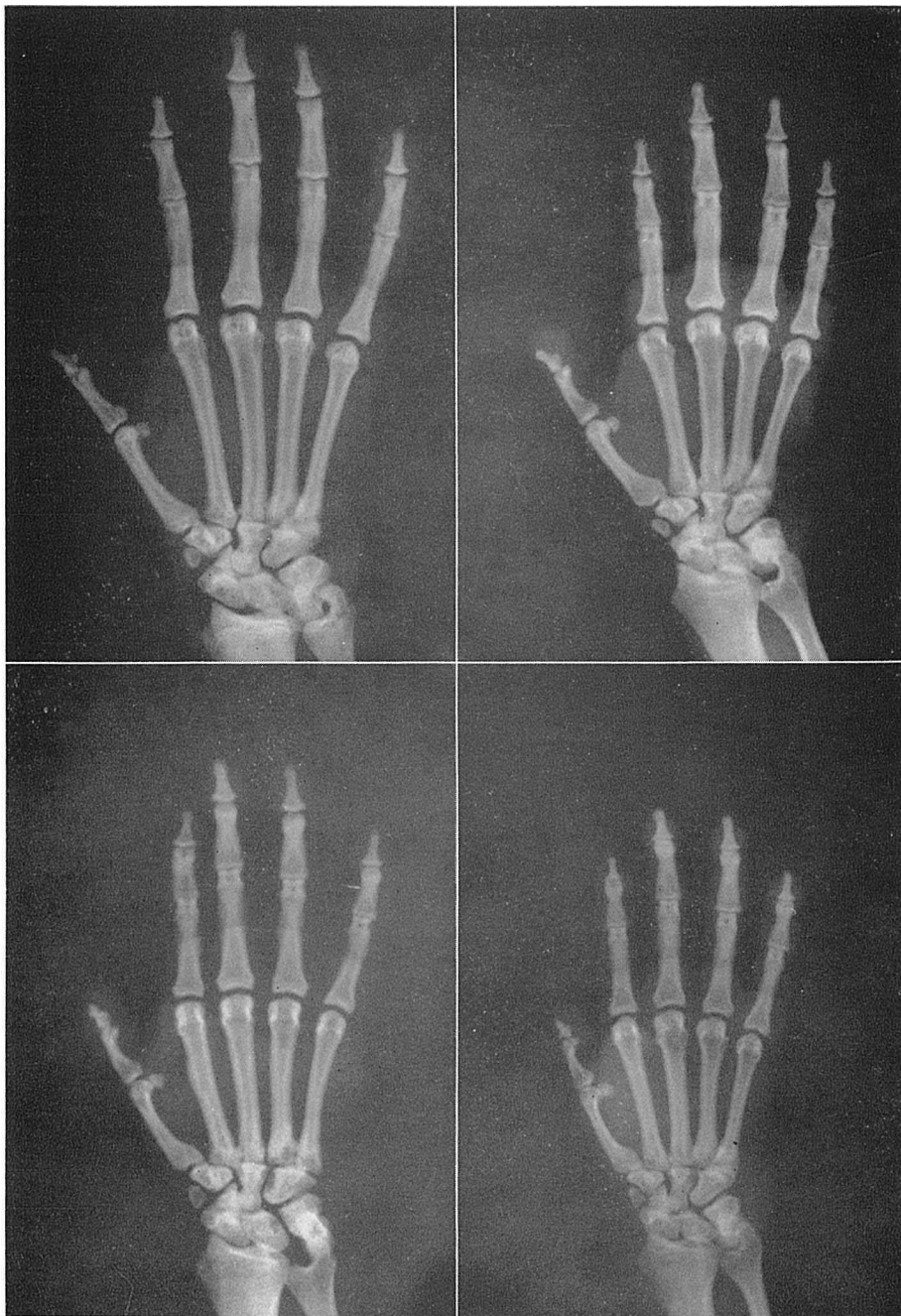


Plate 1. Right hands of adult Japanese macaques.
upper left : Male of Iwatayama troop upper right : Female of Iwatayama troop
lower left : Male of Ohirayama troop lower right : Female of Ohirayama troop