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INHERITANCE OF THE THREE DIGITAL TYPES IN MAN*

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INTRODUCTION

A study of the variation of the distal extent of hand digits reveals certain types. The digits of hand evidently vary in length and diameter, from individual to individual. However, the thumb (digit I) and middle finger (digit III) are the shortest and longest respectively both in absolute dimension as well as in respect of their distal termination. No exception of this relationship has been noted in man. The little finger (digit V) after the thumb has the shortest distal extention. But it has been found that index finger (digit II) and ring finger (digit IV) relatively vary in their distal extent. The index finger may be longer, shorter, or it may have equal distal extent in comparison to the ring finger. The present study, thus, has been oriented to see the mode of inheritance of the digital types based upon the relative length of the index and ring finger.

METHOD AND MATERIAL

To differentiate the three digital types, based upon their relative length of index and ring finger, different methods have been used in the past. These methods vary from rather not very reliable method of observation to a very accurate scientific method of measurement.

Two main points of utter importance to be considered in the determination of the different types are based upon:

(a) the choice of suitable Hand Axis,

(b) determination of relative finger length by a suitable method based upon scientific procedures.

The choice of suitable Hand Axis is important in the sense that a little change in the Axis can put one digital type to another digital type.

In the present investigation a standard Hand Axis (B a n s a l 1967) has been devised on well defined anatomical land-marks.

For the first time the relative lengths of the index and ring fingers have been measured with the help of a scientifically designed intrument called "Modified Dactylometer". The design and the manipulation of the instrument has been described elsewhere (B a n s a l 1969). Quantitative values recorded for the index finger has been subtracted from that of ring finger and this ultimately has been used to derive the qualitative expression of the relative length of the index finger. The three categories formulated are

(a) Index finger shorter to (b) longer to, and (c) equal to ring finger.

In categorising the three different digital types, the abbreviations, IL, IS and IE have been used corresponding to the said three fold expression respectively.

The Material

Data for the present study have been collected in the district of Bulandshahar in Uttar Pradesh, situated at about 42 miles from Delhi. In all 100 biological families constitute the data for the inheritance study of this trait. Families collected are agriculturist by profession and Jat by caste. Seven families have two children each; 4 families have six children each one family has seven children and the rest of the families included have three or more than three children. The total number of children comes to 342 out of which 182 are male and 160 female. Measurements of the index and ring finger have been taken on each member of the family, i.e. father, mother and each of the children with the help of the Modified Dactylometer.

Results and Discussion

In tables of the mating types like $I_L \times I_S$ etc. the first type always refers to the male parent and the second to the female parent. In discussion, very often 'usual order' has been mentioned to mean I_L, I_S and I_E respectively.

Tables 1—3 will show bimanual sex wise occurrence of the various digital types of the offsprings of homologous (when both the parents have same type) combination in parents. 37 families (with total

* Forms a part of the Ph. D. thesis.

TABLE 1

Types of digital formulae among the offspring of Families with I_L vs. I_L combination

Digital formula of the offspring	No. of families	Hand	Offspring types				Total No.	
			Abs. Nos.		Percentage		Abs. Nos.	Percentage
			M	F	M	F		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
I_L	12 families with	Left	21	18	80.77	90.00	39	84.78
I_S	26♂ + 20♀	Hand	2	1	7.69	5.00	3	6.52
I_E			3	1	11.53	5.00	4	8.69
I_L	25 families with	Right	35	34	83.33	80.95	69	82.14
I_S	42♂ + 42♀	Hand	4	2	9.52	4.76	6	7.14
I_E			3	6	7.14	14.28	9	10.71
I_L	37 families with	Both	56	52	82.35	83.87	108	83.07
I_S	68♂ + 62♀	Hands	6	3	8.82	4.84	9	6.92
I_E			6	7	8.82	11.29	13	10.00

TABLE 2

Types of digital formulae among the offsprings of families with I_S vs. I_S combination

Digital formula of the offspring	No. of families	Hand	Offspring types				Total No.	
			Abs. Nos.		Percentage		Abs. Nos.	Percentage
			M	F	M	F		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
I_L	18 families with	Left	4	2	10.00	7.40	6	8.95
I_S	40♂ + 27♀	hand	27	22	67.50	81.48	49	73.13
I_E			9	3	22.50	11.11	12	17.91
I_L	8 families with	Right	3	1	17.65	5.55	4	11.43
I_S	17♂ + 18♀	hand	12	13	70.58	72.22	25	71.43
I_E			2	4	11.76	22.22	6	17.14
I_L	26 families with	Both	7	3	12.28	6.67	10	9.80
I_S	57♂ + 45♀	hands	39	35	68.42	77.77	74	72.55
I_E			11	7	19.30	15.55	18	17.65

TABLE 3

Types of digital formulae among the offsprings of families with I_E vs. I_E combination

Digital formulae of the offspring	No. of families	Hand	Offspring types				Total No.	
			Abs. Nos.		Percentage		Abs. Nos.	Percentage
			M	F	M	F		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
I_L	6 families with	Left	—	2	—	16.66	2	10.00
I_S	8♂ + 12♀	hand	3	3	37.50	25.00	6	30.00
I_E			5	7	62.50	58.33	12	60.00
I_L	5 families with	Right	2	2	33.33	22.22	4	26.66
I_S	6♂ + 9♀	hand	1	2	16.66	22.22	3	20.00
I_E			3	5	50.00	55.55	8	53.33
I_L	11 families with	Both	2	4	14.29	19.05	6	17.14
I_S	14♂ + 21♀	hand	4	5	28.57	23.81	9	25.71
I_E			8	12	57.14	57.14	20	57.14

TABLE 4

Types of digital formulae among the offsprings of families with I_L vs. I_S combination

Digital formulae of the offsprings	No. of families	Hand	Offspring types				Total No.	
			Abs. Nos.		Percentage		Abs. Nos.	Percentage
			M	F	M	F		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
I_L	9 families with	Left	8	6	44.44	50.00	14	46.67
I_S	18♂ + 12♀	hand	6	3	33.33	25.00	9	30.00
I_E			4	3	22.22	25.00	7	23.33
I_L	9 families with	Right	11	6	61.11	42.86	17	53.12
I_S	18♂ + 14♀	hand	5	6	27.78	42.86	11	34.38
I_E			2	2	11.11	14.28	4	12.50
I_L	18 families with	Both	19	12	52.78	46.15	31	50.00
I_S	36♂ + 26♀	hands	11	9	30.55	34.62	20	32.26
I_E			6	5	16.67	19.23	11	17.74

TABLE 5

Types of digital formulae among the offsprings of families with I_S vs. I_L combination

Digital formulae of the offsprings	No. of families	Hand	Offspring Types				Total No.	
			Abs. Nos.		Percentage		Abs. Nos.	Percentage
			M	F	M	F		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
I_L	28 families with	Left	22	20	50.00	40.82	42	45.16
I_S	44♂ + 49♀	hand	16	26	36.36	53.06	42	45.16
I_E			6	3	13.64	6.12	9	9.68
I_L	24 families with	Right	29	19	65.91	55.88	48	61.54
I_S	44♂ + 34♀	hand	11	13	25.00	38.24	24	30.77
I_E			4	2	9.09	5.88	6	7.69
I_L	52 families with	Both	51	39	57.95	46.99	90	52.63
I_S	88♂ + 83♀	hands	27	39	30.68	46.99	66	38.60
I_E			10	5	11.36	6.02	15	8.77

68 + 62 children) are I_L vs. I_L mating, 26 families (with total 57 + 45 children) of I_S vs. I_S mating and 11 families are (with 14 + 21 children) of I_E vs. I_E mating.

In all these homologous combinations it is observed that offsprings fall maximum within the range of their parental combinations. In IL × IL and IS × IS combinations, the frequencies of IL and IS types among offspring is as high as 70 percent and 80 percent respectively. However, the IE × IE parental combination shows nearly 60 percent of the children belonging to IE type. Thus we see from these tables that in all the above mating groups, the offspring irrespective of their sex and bimanuality, show a marked predominance of the parental type. When compared between the two sexes, a divergence can be observed between them in the expression of the degree of predominance.

In tables 4 and 5 the digital condition of the offspring of the parental mating IL and IS is shown, once with IL father (table 4) and next with IS father (table 5). In the parental combination of IL × IS type it is found that IL type predominate among the offspring; next follows the IS type and minimum frequency is of IE type. The same phenomenon is seen in the parental combination of IS×IL type, i.e. the order of preforndarance of the digit types among the offspring is of usual order of IL, IS and IE type in respect to their frequencies.

Next two parental combinations considered are in which one of the parental type has been replaced by IE type instead of IS type as in early cases. Thus parental combinations formed are IL × IE, and IE × IL types (tables 6 and 7). In both these combinations it can be noted that while IL still predominates among the children, the IS type falls to the minimum. Two interesting points merge out from these combinations. One is that in the left hand combination of IE × IL parental type all the off springs are of IL type. It may be contributed to the less number of families with less number of offsprings in this particular combination. The other point which appears to be notable from these two

TABLE 6

Types of digital formulae among the offsprings of families with I_L vs. I_E combination

Digital formulae of the offsprings	Name of families	Hand	Offspring types				Total No.	
			Abs. Nos.		Percentage		Abs. Nos.	Percentage
			M	F	M	F		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
I_L	7 families with	Left	8	6	53.33	54.55	14	53.85
I_S	156♂ + 11♀	hand	3	2	20.00	18.18	5	19.23
I_E			4	3	26.67	27.27	7	26.92
I_L	4 families with	Right	4	4	40.00	80.00	8	53.33
I_S	10♂ + 5♀	hand	3	—	30.00	—	3	20.00
I_E			3	1	30.00	20.00	4	26.67
I_L	11 families with	Both	12	10	48.00	62.50	22	53.66
I_S	25♂ + 16♀	hands	6	2	24.00	12.50	8	19.51
I_E			7	4	28.00	25.00	11	26.83

TABLE 7

Types of digital formulae among the offsprings of families with I_E vs. I_L combination

Digital formula of the offsprings	No. of families	Hand	Offspring types				Total Nos.	
			Abs. Nos.		Percentage		Abs. Nos.	Percentage
			M	F	M	F		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
I_L	8 families with	Left	8	4	100.00	25.00	12	50.00
I_S	8♂ + 16♀	hand	—	4	—	25.00	4	16.67
I_E			—	8	—	50.00	8	33.33
I_L	12 families with	Right	13	16	59.09	80.00	29	69.05
I_S	22♂ + 20♀	hand	5	2	22.73	10.00	7	16.67
I_E			4	2	18.18	10.00	6	14.28
I_L	20 families with	Both	21	20	70.00	55.56	41	62.12
I_S	30♂ + 36♀	hands	5	6	16.67	16.67	11	16.67
I_E			4	10	13.33	27.77	14	21.21

tables is that children are more of IL type when mother is IL as compared to when father is IL type.

The last two parental combinations are of mating between IS × IE types, once IS as father and secondly IE as father. The frequencies of different digital types among offspring from these parental types have been tabulated in tables 8 and 9.

In both the cases the number of offsprings are maximum of IS type and minimum of IL type which is evident as this type is not represented at all in the parental combination. The value of IE type among off spring is next higher to that of IS type. Further on comparing these two tables we find that IS × IE parental combination has yielded more of IS types of children than those from IE × IS parental combination. Further, IE condition increases in the later mating as compared to the former.

The retrospective of the above discussions can further be stated through the reverse behaviour, i.e. by seeing the presence of IL, IS and IE types separately among the offspring out of all the parental combinations.

Tables 10—12 are specially designed to show the expressivity of the IL, IS and IE types in relation to the sex of the parents and also the inter-dependence of one type over the other. The digital types of mating combinations are listed in columns 2 to 8 in these tables, separately for left and right hands as well as both hands combined.

It could be seen from the table 10 that offspring born of both parents having IL are remarkably closer to their parents, in lien to the fact a noticeable decline could be seen when only one parent is carrying the trait. When both the parents show absence of IL type, the majority of the children show the absence of IL type. This condition is further expressed in two ways i.e. those parents showing absence of IL but having IS or IE homologous mating; when both parents are IS type, the offspring having IL types are least and when both parents are IE type the off spring show the ries in the frequency of IL type.

It appears that IS and IL conditions show the two extremes, while IE falls in between the expressivity of the trait under discussion. Thus it hints at

TABLE 8

Types of digital formulae among the offsprings of families with I_S vs. I_E combination

Digital formulae of the offsprings	No. of families	Hand	Offspring types				Total No.	
			Abs. Nos.		Percentage		Abs. Nos.	Percentage
			M	F	M	F		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
I_L	10 families with	Left	3	4	15.79	36.36	7	23.33
I_S	19♂ + 11♀	hand	10	—	52.63	—	10	33.33
I_E			6	7	31.58	63.63	13	43.33
I_L	10 families with	Right	5	3	29.41	18.75	8	24.24
I_S	17♂ + 16♀	hand	9	10	52.94	62.50	19	57.58
I_E			3	3	17.65	18.75	6	18.18
I_L	20 families with	Both	8	7	22.22	25.93	15	23.81
I_S	36♂ + 27♀	hands	19	10	52.78	37.04	29	46.03
I_E			9	10	25.00	37.04	19	30.16

TABLE 9

Types of digital formulae among the offsprings of families with I_E vs. I_S combination

Digital formulae of the offsprings	No. of families	Hand	Offspring types				Total No.	
			Abs. Nos.		Percentage		Abs. Nos.	Percentage
			M	F	M	F		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
I_L	2 families with	Left	1	—	25.00	—	1	16.67
I_S	4♂ + 2♀	hand	2	—	50.00	—	2	33.33
I_E			1	2	25.00	100.00	3	50.00
I_L	3 families with	Right	1	1	16.67	50.00	2	25.00
I_S	6♂ + 2♀	hand	3	1	50.00	50.00	4	50.00
I_E			2	—	33.33	—	2	25.00
I_L	5 families with	Both	2	1	20.00	25.00	3	21.43
I_S	10♂ + 4♀	hands	5	1	50.00	25.00	6	42.86
I_E			3	2	30.00	50.00	5	35.71

the dominating influence of IL type over IS type offspring among the various parental matings.

Speaking in terms of ratio it appears that offspring born of parental mating having IL × IL show absence or presence of the trait (IL type) in the ratio of 1 : 5. The offspring born of parental matings as IS × IS and IE × IE show the absence and presence of IL type in the ratio of 9 : 1 and 4 : 1 respectively. The above ratios are suggestive of the fact that IL condition and IS condition show the reverse effect in their expressivity, but under IE condition we find that the number of offspring having IL condition are more in the mating of IE×IE than in the mating of IS×IS. The ratio of absence or presence of IL type among the offspring born of the matings where at least one parent is having IL type lies in between the said ratios.

Almost the same picture can be seen even when we observe the ratios in left hand or right hand separately.

In the same way the explanation of table 11 shows the preponderance of IS children under IS × IS mating. The parents showing the absence of IS × IS combination shows the minimum number of IS bearing children. The number of offspring born of both parents showing absence of IS type in their mating but having IE × IE mating donot show the similar extent in expressivity of IS children as indicated by IL × IL mating type.

Further it could be seen that when only one parent is having the trait under question, the number of offspring show decline in carrying the trait. This condition shows a different effect when father or mother is carrying the trait.

Before we should think of any hypothetical suggestion i.e. IL dominates over IS in its expressivity, the very anomaly in the expression of IE condition debars it from further conclusion. But to converge the problem the above conditions could logically be assigned to the facts:

(i) That the digital types are not determined by a single pair of set of factors or genes but there must be multiple factors or sets of genes responsible for its expression.

(ii) That conditions IL and IS are determined by the presence of genetic factors in combination with

TABLE 10

Showing the presence & absence of I_L type among

Occurrence of I_L among children,			Number of offspring								
			Both Parents having I_L			One parent (father) having I_L & mother I_S			One parent (father) having I_L and mother I_E		
			Male	Female	Total	Male	Female	Total	Male	Female	Total
Left Hand	Present	Abs. No.	21	18	39	8	6	14	8	6	14
		%	80.77	90.0	84.78	44.44	50.00	46.67	53.33	54.55	53.85
	Absent	Abs. No.	5	2	7	10	6	16	7	5	12
		%	19.22	10.00	15.21	55.55	50.00	53.33	46.67	45.45	46.15
Right Hand	Present	Abs. No.	35	34	69	11	6	17	4	4	8
		%	83.33	80.95	82.14	61.11	42.86	53.12	40.00	80.00	53.33
	Absent	Abs. No.	7	8	15	7	8	15	6	1	7
		%	16.66	19.04	17.85	38.89	57.14	46.88	60.00	20.00	46.67
Both Hands	Present	Abs. No.	56	52	108	19	12	31	12	10	22
		%	82.35	83.87	83.07	52.78	46.15	50.00	48.00	62.50	53.66
	Absent	Abs. No.	12	10	22	17	14	31	13	6	19
		%	17.64	16.13	16.92	47.22	53.85	50.00	52.00	37.50	46.34

TABLE 11

Showing the presence and absence of I_S type among

Occurrence of I_S I_S among children.			Number of offspring								
			Both parents having I_S			One parent (father) having I_S and mother I_L			One parent (father) having I_S and mother I_E		
			Male	Female	Total	Male	Female	Total	Male	Female	Total
Left Hand	Present	Abs. No.	27	22	49	16	26	42	10	—	10
		%	67.50	81.48	73.13	36.36	53.06	45.16	52.63	—	33.33
	Absent	Abs. No.	13	5	18	28	23	51	9	11	20
		%	32.50	18.51	26.86	63.64	46.94	54.84	47.37	100.00	66.66
Right Hand	Present	Abs. No.	12	13	25	11	13	24	9	10	19
		%	70.58	72.22	71.42	25.00	38.24	30.77	52.94	62.50	57.58
	Absent	Abs. No.	5	5	10	33	21	54	8	6	14
		%	29.41	27.77	28.57	75.00	61.76	69.23	47.06	37.50	42.42
Both Hands	Present	Abs. No.	39	35	74	27	39	66	19	10	29
		%	68.42	77.77	72.54	30.68	46.99	38.60	52.78	37.04	46.03
	Absent	Abs. No.	18	10	28	61	44	105	17	17	34
		%	31.57	22.22	27.45	69.31	53.01	61.40	47.22	62.96	53.97

TABLE 12

Showing the presence & absence of I_E type among

Occurrence of I_E among children.			Number of offspring								
			Both parents having I_E			One parent (father) having I_E and mother I_L			One parent (father) having I_E and mother I_S		
			Male	Female	Total	Male	Female	Total	Male	Female	Total
Left Hand	Present	Abs. No.	5	7	12	—	8	8	1	2	3
		%	62.50	58.33	60.00	—	50.00	33.33	25.00	100.00	50.00
	Absent	Abs. No.	3	5	8	8	8	16	3	—	3
		%	37.50	41.16	40.00	100.00	50.00	66.66	75.00	—	50.00
Right Hand	Present	Abs. No.	3	5	8	4	2	6	2	—	2
		%	50.00	55.55	53.33	18.18	10.00	14.28	33.33	—	25.00
	Absent	Abs. No.	3	4	7	18	18	36	21	2	6
		%	49.99	44.44	46.66	81.82	90.00	85.71	66.67	100.00	75.00
Both Hands	Present	Abs. No.	8	12	20	4	10	14	3	2	5
		%	57.14	57.14	57.14	13.33	27.77	21.21	30.00	50.00	35.71
	Absent	Abs. No.	6	9	15	26	26	52	7	2	9
		%	42.86	42.86	42.85	86.67	72.23	78.79	70.00	50.00	64.29

offspring from different parental combinations

born of

One parent (mother) having I_L and father I_S			One parent (mother) having I_L and father I_E			Both parents showing absence of I_L having $I_S \times I_S$			Both parents showing absence of I_L & having $I_E \times I_E$		
Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
22	20	42	8	4	12	4	2	6	—	2	2
50.00	40.82	45.16	100.00	25.00	50.00	10.00	7.40	8.95	—	16.16	10.00
22	29	51	—	12	12	36	25	61	8	10	18
50.00	59.18	54.84	—	75.00	50.00	90.00	92.59	91.04	100.00	83.33	90.00
29	19	48	13	16	29	3	1	4	2	2	4
65.91	55.88	61.54	59.09	80.00	69.05	17.65	5.55	11.43	33.33	22.22	26.66
15	15	30	9	4	13	14	17	31	4	7	11
34.09	44.12	38.46	40.91	20.00	30.95	82.34	94.44	88.57	66.66	77.77	73.33
51	39	90	21	20	41	7	3	10	2	4	6
57.95	46.99	52.63	70.00	55.56	62.12	12.28	6.66	9.80	14.29	19.05	17.14
37	44	81	9	16	25	50	42	92	12	17	29
42.04	53.01	47.37	30.00	44.44	37.88	87.71	93.33	90.19	85.71	80.95	82.85

offspring from different parental combination

born of

One parent (mother) having I_S and father I_L			One parent (mother) having I_S and father I_E			Both parents showing absent and I_S and having $I_L \times I_L$			Both parents showing absence of I_S and having $I_E \times I_E$		
Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
6	3	9	2	—	2	2	1	3	3	3	6
33.33	25.00	30.00	50.00	—	33.33	7.69	5.00	6.52	37.50	25.00	30.00
12	9	21	2	2	4	24	19	43	5	9	14
66.66	75.00	69.99	50.00	100.00	66.66	92.30	95.00	93.47	62.50	74.99	70.00
5	6	11	3	1	4	4	2	6	1	2	3
27.78	42.86	34.38	50.00	50.00	50.00	9.52	4.76	7.14	16.66	22.22	20.00
13	8	21	3	1	4	38	40	78	5	7	12
72.27	67.14	65.62	50.00	50.00	50.00	90.47	95.23	92.85	83.33	77.77	80.00
11	9	20	5	1	6	6	3	9	4	5	9
30.55	34.62	32.36	50.00	25.00	42.86	8.82	4.84	6.92	28.57	23.81	25.71
25	17	42	5	3	8	62	59	121	10	16	26
69.45	65.38	67.64	50.00	75.00	57.14	91.17	95.16	93.07	71.43	76.19	74.28

offspring from different parental combination

born of

One parent (mother) having I_E and father I_L			One parent (mother) having I_E and father I_S			Both parents showing absence of I_E and having $I_L \times I_L$			Both parents showing absence of I_E and having $I_S \times I_S$		
Male	Female	Total	Total	Female	Male	Male	Female	Total	Male	Female	Total
4	3	7	6	7	13	3	1	4	9	3	12
26.67	27.27	26.92	31.58	63.64	43.33	11.53	5.00	8.69	22.50	11.11	17.91
11	8	19	13	4	17	23	19	42	31	24	55
73.33	72.73	73.08	68.42	36.36	56.66	88.46	95.00	91.30	77.50	88.88	82.08
3	1	4	3	3	6	3	6	9	2	4	6
30.00	20.00	26.67	17.65	18.75	18.18	7.14	14.28	10.71	11.76	22.22	17.14
7	4	11	14	13	27	39	36	75	15	14	29
70.00	80.00	73.33	82.35	81.25	82.82	92.85	85.71	89.28	88.23	77.77	82.85
7	4	11	9	10	19	6	7	13	11	7	18
28.00	25.00	26.83	25.00	37.04	30.16	8.82	11.29	10.00	19.29	15.55	17.65
18	12	30	27	17	44	62	55	117	46	38	84
72.00	75.00	73.17	75.00	62.96	69.84	91.17	88.71	89.99	80.70	84.44	82.34

other probable factors which modify its expression.

Keeping in view the above results it appears that values given in Table 12 for IE condition among children of different parental combinations falls in the same line as we have seen for other two conditions. In this table it is clear that offspring born of IE × IE mating fall closer to their parental type. The frequency of offspring bearing this type (IE) is maximum in this mating and is minimum when IE type is absent in the mating of both the parents. But in the absence of IE×IE parental mating the frequency of children bearing IE type is comparatively less when IL condition appears than the appearance of IS type as their parental mating types. The frequency of IE type among children is lesser in the mating type when only one parent is present with IE type than in the homologous mating of IE×IE, but its frequency is more when both the parents show absence of this type.

From the above discussion it is clear that frequency of every digital type in the children is least when that particular type is absent in both the parents; increases when one of the parents has that type and is maximum when both the parents have that type. This is suggestive of the fact that though the mode of inheritance is not clear, heredity does play a role in transmitting the digital types from parents to offspring.

SUMMARY

The general transmission of IL, IS and IE types among parents and their offspring show their heritable significance. We find that most of the offspring of various parental combinations fall within the parental range of the types.

It is seen that in three homologous parental combinations the offspring irrespective of their sex show a marked predominance of the parental type.

The parental combination of IL×IL (both the parents showing IL type) shows that the presence of IL type among offspring is as high as 83.07 percent and the absence of this type is noted only among 16,92 percent of offspring. When both the parents are lacking this type (IL) but have either IE×IE mating type or IS×IS type, near about 82 percent of the offspring show the absence of this type. When one of the parents in their mating show this type (ILtype) the offspring tend to show this type in near about 50 percent. The above explanation is true even if data is treated sexwise separately or treated for left and right hand separately.

The presence of IS type is maximum (72.54 percent) in the offspring when both the parents have IS type. The absence of this type is maximum when neither of the parents have this type (74.28 percent). Offspring tend to show intermediate values between these two extremes (one extreme when both the parents have the same type and the other extreme when both the parents lack that type) when either of the parents have the type in question. Likewise in IL×IL combination sex or either of the hand do not alter the said conclusion.

The presence and absence of IE type follows the same path as the other two types have followed. IE type is present maximum only when both the parents have the same type. When both the parents have IE type in mating combination near about 60 percent of the offspring show IE type. The absence of this type is maximum (82.34 percent) when both the parents do not show IE type. Parental combinations in which one of the parents shows this type; the presence of this type among offpring varies between the two extreme cases.

From the above explanation it is suggested that heredity does play a role in this trait. Certain deviations were noted among the offspring. These are suggestive of the fact that either the genes responsible for the transmission of this trait is not completely penetrant or that the trait may be determined by multiple genes. However, the number of families in such combination being rather small donot allow us for making of any definite conclusions.

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