

MEDDELELSER OM GRØNLAND

UDGIVNE AF

KOMMISSIONEN FOR VIDENSKABELIGE UNDERSØGELSER I GRØNLAND

Bd. 203 • Nr. 2

THE POLAR ESKIMOS' EYES

APPENDIX: EAR LOBES

BY

LISBET AND AAGE GILBERG

WITH 6 FIGURES, 14 TABLES AND 3 PLATES



Nyt Nordisk Forlag Arnold Busck

København 1976

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Abstract

In 1963 the authors carried out a four months' expedition to Thule District in North Greenland for the purpose of making an anthropological and genetic-biological study of our old friends, the Polar Eskimos, before urbanization grew out of hand.

A total of 304 persons, or 95% of the highest possible number, from ten years of age and upwards were investigated. Blood samples were taken, and black and white photos of physiognomy, colour photos of eyes and faces, hand- and fingerprints, anthropometric measurements were made. Our pedigrees of the whole population were brought up to date, and were subsequently continued up to 1973.

The eye-investigations in this paper are registered in regard to sex, age and descent.

Quite commonly we found that females have darker eyes than males, and children have darker eyes than adults. 37 persons or 12,1% were found to have mixed coloured iris.

Mongol fold, or similar folds, which pass through the margin of the lower eyelid were found in 209 persons or 68,75%.

Rima palpebralis was registered as round, with female predominance, elliptical, semielliptical and as a split, and in regard to direction quite horizontal, slanting a little upwards, with female predominance, and slanting downwards.

Most Polar Eskimos have triangular eyebrows, right-angled upwards, and lateral.

An appendix concerning the ear lobe form shows, that only 10% Polar Eskimos have real (+) lobes, males three times as often as females.

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BIANCO LUNOS BOGTRYKKERI A/S

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Introduction

The Polar Eskimos live in Thule District, the northwesternmost part of Greenland, which is situated from Holms Ø in Melville Bugt to the south (ca 74°) and Humbolt Gletscher to the north (ca 80°).

We know, however, that the northernmost part of Greenland was inhabited 4,000 years ago (LARSEN, 1965). Immigration took place from Canada and Alaska, and much indicates that the Eskimo culture originated in Asia.

The last wave of immigration to Thule via Ellesmere Land occurred about 1863, and clearly influenced the isolated Thule Eskimos' polymorphology both genetically and anthropologically, and also left ethnographical traces.

For various reasons, including climatological ones, the contact between Thule District, and West Greenland was cut off around 1600. From then until the end of the 19th Century, i.e., for ca 300 years, the Polar Eskimos were an isolated group, apart from their brief encounters with whalers and the first expeditions to these regions; the first of the latter contacts was with the Ross Expedition in 1818.

Around the turn of the 20th Century a number of expeditions visited the area; in 1910 KNUD RASMUSSEN, the Polar explorer, established Thule Trading Station, and at the same time initiated a close collaboration with the Danish Missionary Society, which had sent the first missionaries to Thule the year before.

The Danish State took over the station in 1937. In 1951-53 TAB, the big American air base, was constructed, and this resulted in a clash between a moderate Stone Age and the atomic age of today. This was, accordingly, our last chance for collecting genetical and anthropological material pertaining to this, to date, quite isolated group which was now faced with increasing contacts with other people and with cross-breeding, and was in danger of being wiped out.

As indicated above, there had been quite good possibilities for breeding children with whalers, members of expeditions, labourers, civil servants, and others who visited the district. Nevertheless, to the middle of this century this happened to but a surprisingly small extent; several factors connected with the Polar Eskimos' cultural pattern are responsible,

especially the lengthy nursing period—often 3–4 years, based on tradition and the particularly high protein content of the Eskimos' diet. Thus, as a result of pregnancy and nursing the women did not menstruate for years at a time, and during these lengthy periods possible extra-marital relations did not result in alien men's siring Eskimo children.

A total of at least 300 persons over the age of 10 were examined with respect to eye colour, eye surroundings, and eye fissures, and were also recorded according to ear lobes, blood types, serum albumins, and erythrocyte enzymes. Anthropological measurements were made, finger and handprints were taken, and a genealogy comprising up to 7 generations was compiled.

I. Iris Colour

It shall be pointed out briefly that eye colour depends, not only on the pigmentation of the iris, but also on the embedment of the pigment in the eye's *tunica interna* and *media*, as well as in *conjunctiva bulbi*. But only when the iris pigment is lacking, or especially slight, does the retina have any direct importance to the eye colour. The dark eye colour is almost exclusively due to rich pigment cells in the anterior border layer, *facies ant. iridis*. When this layer is quite thick the pigment in the stroma proper and in the underlying part of the retina cannot have any influence on the colour. On the other hand, when the anterior layer has only a slight supply of pigment, the possibility of numerous nuances arises.

When the eyes are completely blue there is practically no melanin in the iris proper, and it is the black retina pigmentation that shines through the grating of the intermediary tissue and gives the impression of a blue or grey colour, and simultaneously makes a fine pattern on the iris.

For the same reasons newborn Europeans have blue eyes, as the pigmentation of individuals whose eyes become brown later first develops somewhat after birth.

It is presumed that the pigmentation in the iris is completed at the age of 2–3 years. Yet, Japanese studies indicate that the final eye colour is not reached before the age of 6. And other studies, i. e., in Denmark, show that the hereditarily determined eye colour quite frequently is first reached in puberty (HANSEN, 1911; MARTIN, 1961).

The fact that eye colour again becomes somewhat paler with age, just as the sexually determined difference shown by women having a predominance of darker eyes, is apparently generally observed.

It is maintained that the individual variation in population groups with dark eyes is very slight—most convincingly in Negroes, but also in Mongolians. Accordingly, a study of the irises of at least 1,000 Japanese soldiers showed that 0.7% had dark brown eyes, 98.4% medium brown eyes, and 0.8% light brown eyes (NAKAMURA, *in* MARTIN, 1961, p. 1780).

The first studies of the inheritability of eye colour were begun by DE CANDOLLE in 1884. In 1907 and 1908 eye colour was the subject of investigations on the basis of the Mendelian laws—as the first human quality. The conclusion was that brown eye colour is dominant over blue

(grey) (DAVENPORT & DAVENPORT, 1907; HURST, 1908). But exceptions to this rule were soon found.

Since then there has been an abundance of studies of heredity in this area, but the matter has yet to be clarified, and thus we have no possibility of arriving in advance at an estimate of gene frequency in a population group.

One of the purposes of our study, which concerns a multilateral investigation of 304 Polar Eskimos, is to make it possible to place the investigations we have made of eye colour in relation to exact biological characteristics with a clear heredity as to blood types—as well as an unusually valid genealogy treating up to 7 generations.

Assemblage of Materials

Eye colour represents something quite essential to our concept of another human being's appearance and personality. Therefore it is quite paradoxical that most of us are hardly able to describe the colour or the shape of our spouses', our children's, or our closest friends' eyes.

Before the epoch of colour photography we had to investigate eye colour, and so forth, by immediate inspection—practically speaking without being able to make corrections.

When making their pioneering studies in the field of forensic anthropology, GÜRTLER and JENS JENSEN developed a method whereby good photographs of eyes could be taken; this was primarily based on a simple arrangement: photographs taken in the same place, the same room, with the same lighting conditions and with the same distance between the iris and the objective.

We now had to work out a corresponding method, one adapted to Arctic conditions and independent of chances of coming indoors or having access to electricity.

We used a mirror reflex camera (Minolta SR 7), equipped with a telescopic lens mounted on a Novoflex bellow screwed on a tripod, a portable case for apparatus which could be used as a chin support, a piece of burlap stretched between two poles for use as a uniform background. The correct distance between the cornea and the objective, 40 cm, is more or less quickly fixed with the help of a cord fastened to the camera.

For purposes of control, but also in order to have good portraits of the Eskimos, before photographing the eyes we also took, with the same camera and thus on the same roll of film, a picture of the investigated person at a distance of 2 m, and with the head at an intermediate position of 45 degrees. In addition we photographed the subject on black-white film, full face and in profile, also at a distance of 2 m.

Table I. *Distribution by age at intervals of 5-20 years of the 304 persons whose eyes were examined, registered according to age, sex and descent.*

	≥ 60		59-40		39-20		19-15		14-10		<10		Total	Total	%
	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂ + ♀		
Polar Eskimos = P/P	13	5	24	26	28	33	9	6	2	3	0	0	76 + 73	149	49,0
Polar Eskimo/ Greenlander = P/G	1	0	8	2	19	20	13	9	11	10	0	5	52 + 46	98	32,2
Polar Eskimo/ European = P/E	2	0	2	1	2	4	1	1	1	0	0	0	8 + 6	14	4,6
Polar Eskimo/ Mulatto = P/N	0	0	1	0	3	0	1	0	1	0	0	0	6 + 0	6	2,0
Polar Eskimo/ Unknown = P/?	0	0	0	1	0	2	1	0	2	1	0	0	3 + 4	7	2,3
Greenlanders = G/G	1	2	1	5	4	10	1	1	2	2	1	0	10 + 20	30	9,9
	17	7	36	35	56	69	26	17	19	16	1	5	155+149	304	100
Total	24		71		125		43		35		6		304		

Working up of Material

The variations in the brown colour in our material are quite considerable, and show far greater nuances than those in the above-mentioned Japanese study (NAKAMURA); thus, we have 21.4% dark brown, 50.7% brown, and 5.8% light brown.

After we had gone through the material many times and in varying order, we reduced our number of colour groups with the view of eliminating all doubt, and decided on a suitable and simple classification into 3 variations of brown colour and 3 main types of multicoloured eyes:

dark brown = db brown/grey-brown = bgb
 brown = b brown/grey-blue = hgbl
 light brown = lb brown/blue-blue = bblbl,

which are illustrated here by selected colour photos, colour Plate I.

The material comprises 304 persons; their classification by sex, age, and descent is indicated on Table 1.

According to our plans, we wanted the expedition to carry out its various investigations on the greatest possible number of persons over the age of 10 years.

It will be noted from Table 1, however, that 6 children under the age of 10 are included in the investigation. Furthermore, it will be noted that descent is indicated as follows:

Table 2. *Iris Colour.*

Distribution by age		≥ 60		59-40		39-20		19-15		14-10		<10		Total ♂ + ♀	Total	%
		♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀			
Dark brown	P/P.....	1	2	5	5	5	1	2						8 + 13	21	
	P/G.....			1	1		5	3	4	2	5	5		6 + 20	26	
	P/E.....						1							1	1	
	P/N.....					1		1						2	2	
	P/?.....						2				1			3	3	
	G/G.....	1		2	2	4				1	2			3 + 9	12	
		0	2	3	8	8	17	5	6	3	8	0	5	19 + 46	65	21,4
Brown	P/P.....	8	4	11	18	13	20	6	4	2	3			40 + 49	89	
	P/G.....	1		5	1	7	13	4	4	6	4			23 + 22	45	
	P/E.....	1				1	1							2 + 1	3	
	P/N.....			1		2				1				4	4	
	P/?.....							1		1				2	2	
	G/G.....		1		1	2	4	1		1		1		5 + 6	11	
		10	5	17	20	25	38	12	8	11	7	1	0	76 + 78	154	50,7
Light brown	P/P.....	2			2	7	7	2						11 + 9	20	
	P/G.....			2		9	1	5		2	1			18 + 2	20	
	P/E.....				1	1	1	1	1	1				3 + 3	6	
	P/N.....															
	P/?.....				1									1	1	
	G/G.....	1												1	1	
		3	0	2	4	17	9	8	1	3	1	0	0	33 + 15	48	15,8
Brown/ grey- brown	P/P.....			6		2								8	8	
	P/G.....					2								2	2	
	P/E.....															
	P/N.....															
	P/?.....															
	G/G.....				1				1					2	2	
		0	0	6	1	4	0	0	1	0	0	0	0	10 + 2	12	3,9
Brown/ grey- blue	P/P.....	3		4	1	1	1							8 + 2	10	
	P/G.....					1		1	1					1 + 2	3	
	P/E.....	1		2		1								3 + 1	4	
	P/N.....															
	P/?.....									1				1	1	
	G/G.....			1		2								1 + 2	3	
		4	0	7	1	1	5	0	1	2	0	0	0	14 + 7	21	6,9
Brown/ blue- blue	P/P.....			1										1	1	
	P/G.....					1		1						2	2	
	P/E.....															
	P/N.....															
	P/?.....															
	G/G.....				1									1	1	
		0	0	1	1	1	0	1	0	0	0	0	0	3 + 1	4	1,3
Total.....		17	7	36	35	56	69	26	17	19	16	1	5	155 + 149	304	

Code

P/P =	Polar Eskimo	(no knowledge of foreign admixture in ancestors)
P/G =	— —	(Greenlanders among ancestors)
P/E =	— —	(Europeans — —)
P/N =	— —	(Mulatto — —)
P/? =	— —	(unknown admixtures among ancestors)
G/G =	Greenlander	

It should be stressed that the term Greenlander, as well as the term Mulatto, refer to a person in a mixed population with more or less European admixture, and that the term P/? in addition to P/G or P/E or P/N can also refer to P/P.

Among the 304 investigated persons we found that 125 had a foreign ancestral admixture; for 55 of these the admixture took place in the parent-generation, while for the remaining 70 it occurred in the grandparent or the great-grandparent generation.

The investigation comprises 95% of the optimum possible material.

In Table II the results of the investigations of eye colour are shown according to sex and to distinct age groups. The investigation is in agreement with other studies of eye colour in that women have a higher ratio of dark eyes than men, and children a higher ratio than adults (BRYN, 1920; HANSEN, 1911; MARTIN, 1961; SKELLER, 1954; WAARDENBURG, 1930; WINGE, 1922).

Out of the total number of investigated persons 87.9% have brown eyes (267 persons) and 12.1% multicoloured eyes (37 persons). STEFÁNSSON says concerning the Eskimos in Prince Albert's Sound: "Of something less than 1,000 persons, ten or more have blue eyes." (STEFÁNSSON, 1913).

JENNESS found "sixteen light-eyed Copper Eskimos". He explains that this light colour results from repeated cases of snow blindness (JENNESS, 1921, p. 257), but SULLIVAN (1922) very convincingly challenges this curious opinion. SKELLER believes that some of these "observations refer to gerontoxon corneae which is widespread in Arctic regions" (p. 133). When SKELLER made his great demographic study in Angmagssalik (1954) he found 96.2% brown eyed and 3.8% "others"; the latter group, however, included 2 persons with yellow-brown eyes and 2 with brown eyes, but with a whitish periphery. The remainder of the group most likely belongs between MARTIN's scales nos. 10 and 8, "with brownish peripupillary border and greenish periphery. Lower numbers than 8 are not recorded" (p. 134)—thus, none with grey or blue colour. "Four of the 31 eyes are observed in two pairs of brothers and sisters, four in two pairs of parent-children, and ten isolated. The remaining 13 were found in three families."

Table III: *Distribution of the 37 multicoloured eyes (ethnic groups).*

	≥60		59-40		39-20		19-15		14-10		<10		Total ♂ + ♀	Total
	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀		
P/P.....	3		11	1	3	1							17 + 2	19
P/G.....					3	1	1	1	1				5 + 2	7
P/E.....	1		2			1							3 + 1	4
P/N.....														
P/?.....									1				1	1
G/G.....			1	2		2		1					1 + 5	6
	4	0	14	3	6	5	1	2	2				27 + 10	37

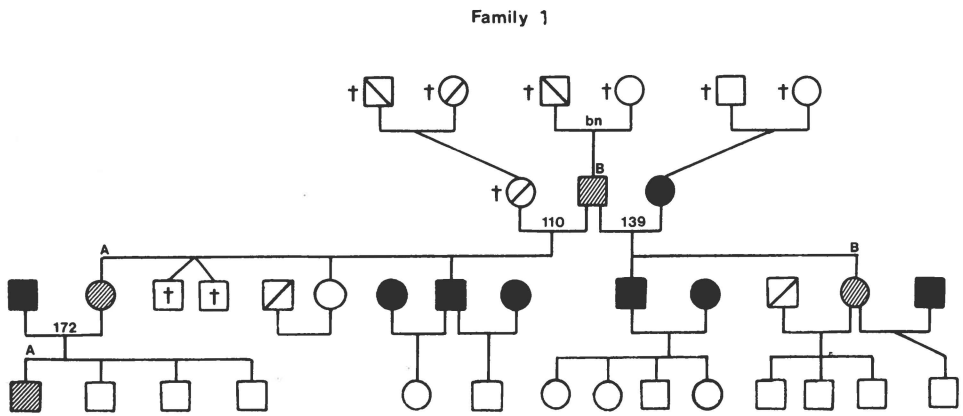


Fig. 1.

Our 37 persons with multicoloured eyes are recorded in Table III. 26 of these 37 persons belong to the 5 families shown here in genealogical tables, (see figures 1-5), while 5 persons are distributed between 2 families, and 2, a boy and his maternal uncle, are members of one family; in regard to the last 4 persons we know that 2 have a white father, one has a completely unknown father, and the last one's father is unknown but in a traditional way regarded as a Polar Eskimo. We know from our genealogical studies that one of the families dealt with received genes from the Polar explorer, PEARLY. This family is recorded as Genealogy 1 (fig. 1), and includes 4 persons with multicoloured eyes.

The mother in the most blue eyed family says herself that she has "2 fathers"; one of them, her biological father, is a West Greenlander, and so is her mother. The family's genealogy (Genealogy 2, fig. 2) shows that the husband of the blue eyed mother has multicoloured eyes. This is also true of his half brother (they have the same mother) and of one cousin and one half cousin, a total of 7 persons with multicoloured eyes.

The 37 persons with multicoloured eyes are listed below in family-groups

<i>Fam. 1:</i>	<u>Bbn</u> <u>A110</u> B139 <u>A172</u>	<i>Fam. 4:</i>	<u>B068</u> <u>C068</u>
<i>Fam. 2:</i>	Awh <u>B128</u> <u>D128</u> <u>B033</u> <u>B035</u> <u>A030</u> <u>B036</u>	<i>Fam. 5:</i>	1/wi 2/wi Bwi Cwi Ewi
<i>Fam. 3:</i>	<u>B020</u> <u>V024</u> C025 <u>D025</u> <u>Ubx</u> <u>A022</u> <u>A018</u> D134	<i>Fam. 6:</i>	<u>B007</u> <u>A060</u> <u>A097</u>
		<i>Fam. 7:</i>	<u>B028</u> <u>A073</u>
		<i>Fam. 8:</i>	<u>J002</u> <u>C072</u>
		<i>others:</i>	<u>Add</u> <u>Adj</u> <u>A231</u> <u>Acb</u>

Parents-children-combinations in relation to eye colour are listed in Table IV.

Family 2

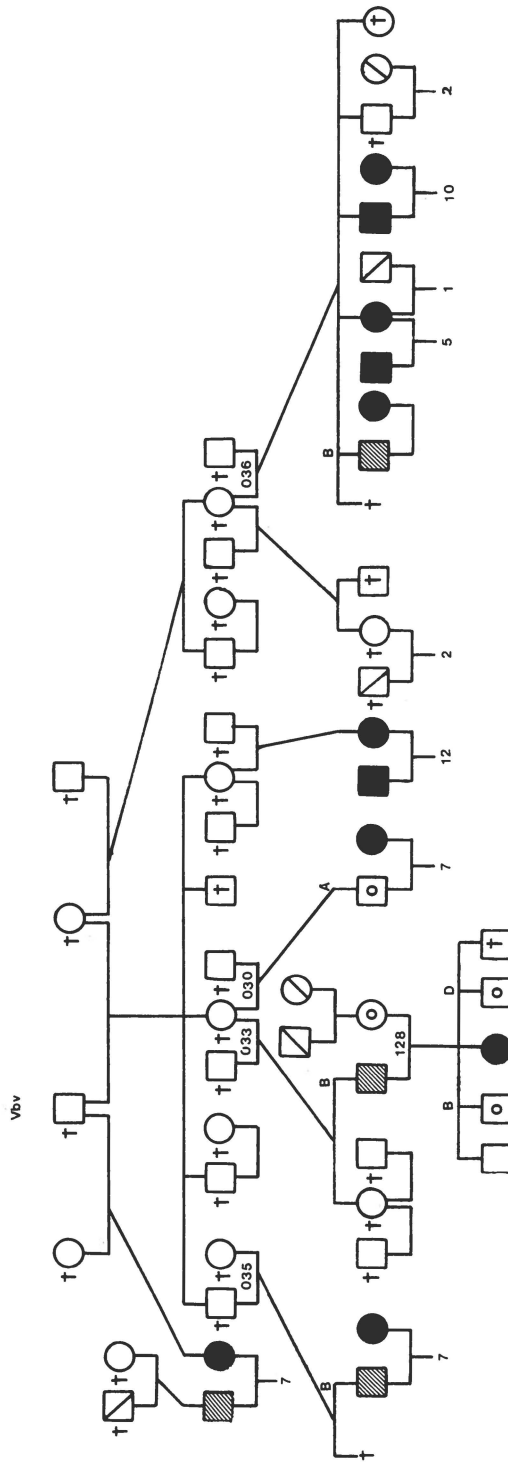


Fig. 2.

Family 3

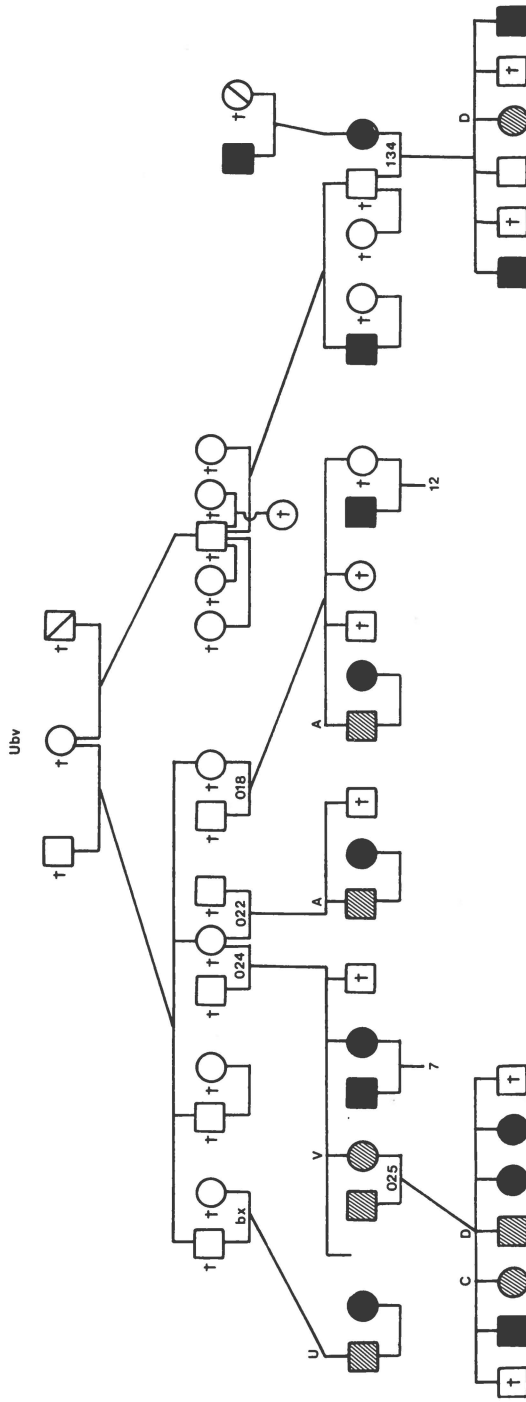


Fig. 3.

Table IV. *Parents-children-combinations in relation to eye colour.*

Father - Mother		No. of Families	Child B	Child M	Child Total
B	B	26	77	1	78
B	M	1	0	1	1
M	B	8	25	1	26
M	M	3	7	7	14
B	dead	14	37	0	37
dead	B	15	25	5	30
M	dead	2	3	1	4
dead	M	0	0	0	0
Total		69	174	16	190

B = Brown; M = Varicoloured (multicoloured).

As for the 3rd family (fig. 3), we have not been able to find any reliable genealogical explanation of the varicoloured eyes which appear in 8 persons—pater and mater and 2 of their 5 children (+2 dead children), as well as in 2 cousins and a half-brother of mater, and, finally, a grandchild of mater's mother's half-brother. This half-brother evidently has a white father. Furthermore, there is a certain relationship between fam. 2 and 3, as pater in fam. 2 has great-grandparents in common with our investigated mater in fam. 3.

The 4th family's varicoloured eyes are represented by a pair of twins—2 grown up men—from a mixed marriage, where mater is a Greenlander, but has brown eyes. The members of the 5th family are naturalized West Greenlanders, and thus do not belong to the Polar Eskimo population. Here there are 5 persons with multicoloured eyes.

With respect to the 37 persons who have multicoloured eyes, various other data are shown in the above-mentioned genealogy (GILBERG, in prep.), in which a list of all the investigated persons' data is given; this includes the analytical results of our blood tests.

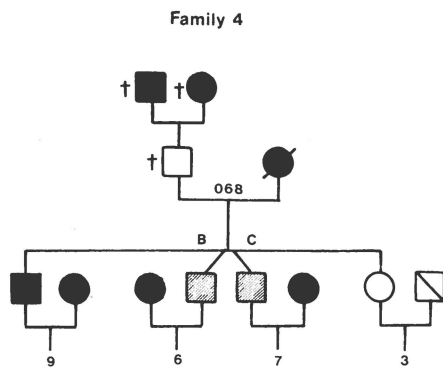


Fig. 4.

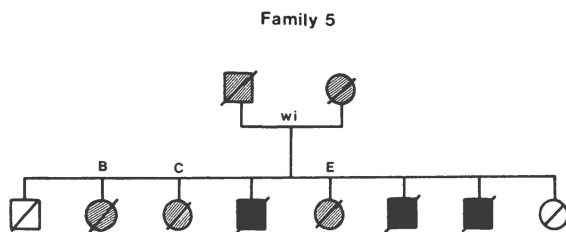


Fig 5.

II. Eye Surroundings

A. Eye Folds

Eye folds in connection with descriptions of Eskimos—and probably on the whole—are first mentioned in the literature of 1824 in Captain WILLIAM EDWARD PARRY'S book. In 1821–23 PARRY and the members of his expedition meet some Eskimos with whom they come into quite good contact. He says that “unlike ours, the eye fissure is not horizontal, but is lower at the nasal part than at the opposite end” (p. 493). And Dr. EDWARDS, the expedition's physician, mentions (p. 548) a fold of skin at *canthus internus* in the Eskimos. Eye folds at *canthus internus* are later mentioned by SCHÖN (1828), and soon many other studies follow.

During the following 150 years studies on the subject of eye folds occupied an important place in anthropological literature. At the same time there was a good deal of confusion with respect to a clear definition of these folds, even as to the quite characteristic Mongol fold. Likewise, there is considerable disagreement about the origin and heredity of these folds.

The work of OTTO AICHEL (1933) is most basically important to our understanding of the concept of eye folds and its limitation. AICHEL says that the name *Epicanthus* should only be used for pathological or completely individual formations. In contrast to this he calls folds which occur frequently as racial characteristics “plicae” and adds the racial designation, e. g., *plica mongolis*. Correspondingly he establishes the designations Hottentot Fold, Negro Fold, and Indian Fold (the latter discovered by him). The fold which occurs quite frequently in European and Indian children, but disappears with age, should also be called Mongol fold, as it does not differ morphologically from this fold. From now on it is called infantile Mongol fold.

The confusing number of folds with still more confusing and numerous names is hereupon reduced to:

1. *Epicanthus* (anomaly)
2. Mongol fold
3. Hottentot fold
4. Negro fold
5. Indian fold

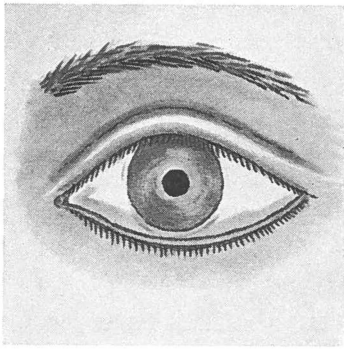
AICHEL points out that in describing the folds in detail it can become necessary to operate with whole formulas capable, for example, of describing the fold's distinctness or its place in relation to *caruncula lacrimalis*, which it can cover completely, cut across, or touch. The literature mentions some formulas of this kind, e.g., WENINGER-PÖCH's, which one has tried to introduce as a standard designation. CHOUKE (1929) uses in his investigations DREW's (1889) 3 degrees of the Mongol fold. K. HILDÉN (1941) uses the classical English system of registration, published by the British Association for the Advancement of Science, London, 1892; this is also used in our study. Lack of fold is indicated by 0, touching of caruncula by 1, cutting across of the caruncula, so that $\frac{1}{3}$ - $\frac{2}{3}$ of it is covered, by 2, and when the entire caruncula is covered, by 3.

This study deals primarily with:

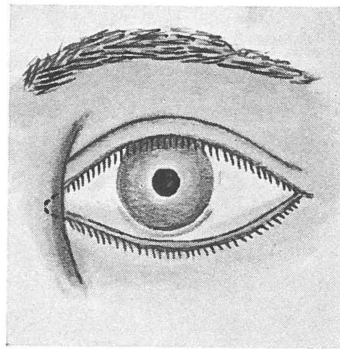
1. The Mongol fold (*plica naso-palpebralis* sup.), which is registered according to AICHEL's definition: "Vom Deckfaltenrand des Oberlides ausgehende, zur Haut unterhalb des medialen Augenwinkels schräg medial und abwärts ziehende Falte" (p. 139). In true Mongol eye this fold is closely connected with the covering fold, *pars orbitalis*. If the lower attachment of the Mongol fold extends temporally into the lower eyelid, we speak about a double Mongol fold.

2. The Indian fold (*plica naso-marginalis*) is defined by AICHEL as a fold "die vom Lidrand selbst gebildet wird, wobei der Tränensee mehr oder weniger, ja ganz darunter verschwinden kann. Der Rand der Falte wird also von dem Wimpertragen - den Abschnitt des Lides gebildet, Die Wimpern sind von ihrem Ursprung ab sichtbar" (p. 153), that is, the Indian fold comes from the free margin of the upper eyelid, thus not covering the cilia.

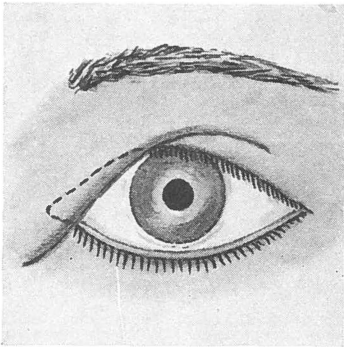
AICHEL far from denies that the Mongol fold can occur in Indians, among whom he furthermore observed it himself, while SALLER (1930) did not find the Mongol fold in adult Indians. But he deplors the many misunderstandings which arose before the Indian fold was known, and thought that all folds at the inner corner of the eye in Indians were Mongol folds; this supported the theory that the Indians had immigrated from Asia, and that all Indians accordingly are descendants of Mongolians, a theory that can agree with a contemporary anthropological point of view. The Indian fold, like the Mongol fold, can occur all over the world as an individual formation; this does not, however, alter the described racial peculiarities or create a suspicion of a strange relationship (BIRKET-SMITH, 1940).



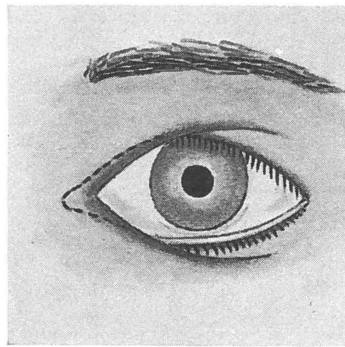
1. European.



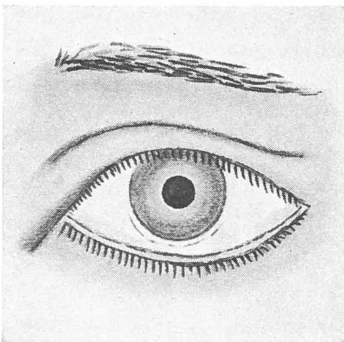
2. Epicanthus.
(SCHÖN - v. AMMON)



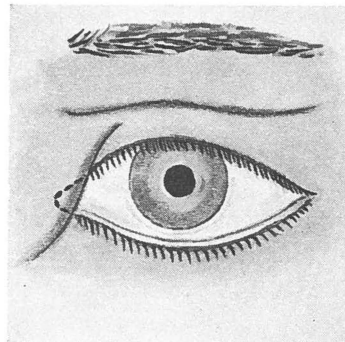
3. Mongol Fold.
(v. SIEBOLD)



4. Double Mongol Fold.
(BAELZ)



5. Indian Fold.
(AICHEL)



6. Eskimo Fold.

Fig. 6. Schematic representation of skin folds of the eyelid.
(Taken from SKELLER, (1954) who is the first describer of Eskimo fold).

3. The Eskimo fold differs from the Mongol fold by radiating from *pars tarsalis palpebralis* under *sulcus orbitopalpebralis*. NORDENSKIÖLD, LEEDEN and FISCHER called attention to a special Eskimo fold (BAUR, FISCHER & LENZ, 1936). GIFFOLD (1928) and WAARDENBURG (1930) mentioned fold variations similar to the Eskimo fold; the description and occurrence of these were really thoroughly treated for the first time by ERIK SKELLER in his study of the Angmagssalik Eskimos (1954) in which he also points out that he had not found a single instance of Epicanthus, while he and J. ØSTER found out of a total of 70 Danish mongoloid patients 15 with Epicanthus, but only one with a true Mongol fold (1951).

SKELLER regards the Eskimo fold as an "impaired" form of Mongol fold and finds that it increases with age, while the Mongol fold decreases, which indicates that these folds merge into each other. The fold formation can be different on the two eyes; indeed, it can be lacking on one eye even though it is pronounced on the other eye.

Studies of Eskimo eye folds are rare; the most well-known ones include HRDLICKA (1910), PARRY (1824), PETERS (1934).

BIRKET-SMITH (1940, p. 71) points out that the Mongol fold is not nearly as common in Eskimos as assumed. He calls attention to the fact that in Greenland there is a special word for Mongol eye—qingassut—which would scarcely exist if eyes of this kind were common. He maintains that the fold is never so developed that *caruncula lacrimalis* is completely covered.

In his material comprising of 111 persons BIRKET-SMITH uses the designations Mongol fold and Epicanthus indiscriminately, but in all cases he apparently means what we, along with AICHEL, understand by the name Mongol fold. BIRKET-SMITH finds 26% with folds and 74% without folds. He does not relate his results to age distribution, but says that there were scarcely any persons over the age of 40 with folds, but points out at the same time that he is uncertain about the age of the persons in question.

In his comprehensive material from Angmagssalik SKELLER (1954) finds quite another distribution of folds, since as much as 90% have fold formations; thus, 46.9% have Mongol fold, 43.9% Eskimo fold, while 9.2% have other types of folds or none at all.

Unfortunately, HILDÉN's (1939) urgent appeal for exact information regarding the distribution of the material by age groups was not met; yet the material is divided into groups of 0-6 years, 7-14 years, and 15 years and over, which is suggestive of the above-mentioned tendency. He finds no convincing sexual differentiation of fold formation.

4. Epicanthus, as defined by AICHEL: "Zwischen pars orbitalis des Ober- und Unterlides ausgespannte lateralwärts konkave mediale Augenfalte" (1933, p. 134).

Problems of Heredity

Some authors have dealt with the question of eye folds' heredity.

V. HIPPEL (1908) claims that heredity has been proved several times, and refers in this connection to 2 family studies.

MEIROWSKY (1925) publishes a pedigree covering 5 generations in which Mongol folds were characteristic, since 31 of the 87 descendants of the progenitor had, along with him, Mongol fold. MEIROWSKY also describes some studies of twins, and concludes: "Es handelt sich also bei dem Epicanthus offenbar um ein einfach dominant vererbbares Merkmal" (p. 415).

According to AICHEL (1933) these investigations clearly show that Epicanthus can be hereditary. But of course it is conditional that formations of this type are noticed and recorded, should a more detailed analysis of the hereditary question be made; first and foremost the above-mentioned confusion of the different eyelid folds creates difficulties, unless one keeps clearly separate entirely different things such as Epicanthus, infantile Mongol fold, adult Mongol fold, pathological fold formation, etc. AICHEL writes about a family with 3 cases of Epicanthus and also mentions FISCHER's assertion regarding dominant heredity of the Mongol fold on the Bonin Islands, in contrast to the Eskimo situation: "Das vorliegende Material über Eskimos sei aber noch zu gering, um den Erbgang als sichergestellt betrachten zu können" (p. 142).

AICHEL concludes with respect to Mongol fold: "Die Vererbung der Mongolenfalte kann bei der Häufung innerhalb der mongolischen Rasse und der Mongolmischlingen nicht in Frage gestellt werden" (p. 141). MENSCHLICHE ERLEHRE (BAUR, FISCHER & LENZ, 1936) reviews a number of studies, i. e., from the Bonin Islands, all of which show that F_1 cross-breeding between Japanese, Chinese, Polynesians, Annanites, etc. on the one side and Europeans on the other result in the East Asians' eye fold dominating over the Europeans' lacking fold.

In contrast to this E. FISCHER (1930) was able to demonstrate that the Hottentot fold is recessive, which emphasizes the fact that although the Mongol fold and the Hottentot fold resemble each other, they differ genetically and are viewed as 2 different mutational developments in man.

"Aber damit nicht genug. Die Eskimo haben ebenfalls die (anatomischen) gleiche Augenfalte. Da man die Eskimo allgemein zu den Mongoliden rechnet (wobei gerade diese Falte, etwas neben den Haarform, als besondere Beweis gilt) spricht man hier bisher stets von Mongolenfalte der Eskimo. Aber sie vererbt sich in Kreuzung mit Europäern rezessiv. Es ist also genetisch nicht die Mongolenfalte" (p. 200). FISCHER refers in this connection to reports from LEEDEN and NORDENSKIÖLD, and continues: "Auch die Eskimo-Augenfalte ist also genetisch selbstän-

dig entstanden und beweist nicht nur kein Mongolentum, sondern spricht geradezu gegen eine Mongolenverwandtschaft" (p. 200). He believes that with this the question of the Eskimos' ethnic rubrication has again come up and requires throughout study. In his personal opinion they do not belong to the Mongolian race.

No usable information is available concerning the inheritability of Epicanthus in the proper sense. As SKELLER mentions, there are no pedigrees giving information about pure Epicanthus. He states, moreover: "Without investigating every individual crossing—which was not done for the Angmagssaliks—it is impossible to study the inheritance. It may be mentioned that in Angmagssalik 34 eyes of hybrids (Eskimo/Caucasoid) were examined. 18 of these eyes show fold formation (Mongol fold or Eskimo fold), while in unmixed individuals 1,451 among 1,598 eyes present folds. If cases with double Mongol fold and double origin of marginal fold are added, the number of 1,451 is increased to 1,518.

Summarizing this review regarding skin folds of the upper eyelid, it may be said that, in Angmagssalik Eskimos, a fold is described which is termed Eskimo fold and which is observed in 58.8% individuals examined at the age of ≥ 15 years and in 43.9% of all examinees. Furthermore, studies of the configuration of the eyelid represent an excellent field of investigation for future anthropologic research. Up to the present, however, the various fold formations have not been differentiated clearly enough in the different ethnical groups" (1954, p. 167).

KAJ BIRKET-SMITH concludes his "Anthropological observations on the central eskimos" as follows: "The deeper we delve down into Eskimo race history, the clearer does our ignorance become. What we need first and foremost is an anthropometric examination of the Polar Eskimos and the inhabitants of Baffin Island in the east, and of the Pacific Eskimos in the west, as well as the thorough unravelling of the heredity of Eskimo race characters. It need scarcely be said that this would be a large and fertile field for Danish science. Not only does Polar Eskimo research fall naturally upon us, but for heredity research there is a splendid field in West Greenland, where in many cases the old church records permit the tracing of the population several generations back. It is to be hoped that physical anthropology, which hitherto has found few students in Denmark, will succeed in attracting more interest in the future" (p. 116).

The statements quoted above have prompted us to a high degree to assemble the present material on the Polar Eskimos.

Present Investigations

Our own investigations are based on the same materials which are dealt with in our study of the iris colour in Polar Eskimos. It comprises 304 persons.

In addition to examinations, our studies are based on 5 photographs taken of each person, namely, black/white photographs taken full face and in profile, as well as semi-profile in colour. All 3 photographs were taken with a 135 mm objective at a distance of 2 meters. In addition colour photographs of each eye were taken with tele-bellow equipment at a distance of 40 cm. Thus it was possible to register and control the eyes' folds as often as desirable.

In illustration of the folds dealt with in this study representative colour photos of each one are shown in Colour Plate II.

1. Mongol fold
2. Double Mongol fold
3. Eskimo fold
4. Double Eskimo fold
5. Indian fold
6. Epicanthus

The two main groups: + fold and ÷ fold, comprise, respectively, 209 persons with fold, 108 women and 101 men, while 95 do not have folds, 41 women and 54 men (table V).

A total of 7 persons, 3 women and 4 men, had fold, on only one eye. 39 persons, 21 women and 18 men, show a difference on the right and the left eye.

Folds which cannot reliably be assigned to any of the above-mentioned groups, but which clearly exist and cut across the free border of the lower eyelid, are designated uncharacteristic. These were found on both eyes of 18 persons, 9 men and 9 women, and on only one eye on 1 man and 4 women, a total of 5.

Table V. + and ÷ fold.

	≥60		59-40		39-20		19-15		14-10		<10		Total	Total
	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂ + ♀	
+	3	0	12	12	46	60	23	15	16	16	1	5	101+108	209
÷	14	7	24	23	10	9	3	2	3	0	0	0	54+ 41	95
Total	17	7	36	35	56	69	26	17	19	16	1	5	155+149	304

In illustration of the fold's occurrence in the different age groups the percentage of its occurrence is registered for each group; it can be seen that it is 100 in the lowest age group, and 17.6 in the highest one.

+ Fold in %	17.6	0	33.3	34.3	82.1	87	88.5	88.2	84.2	100	100	100	65.2	72.5	68.75
÷ Fold	82.4	100	66.7	65.7	17.9	13	11.5	11.8	15.8	0	0	0	34.8	27.5	31.25

Table VI. *The material's 304 persons*

		≥60			59-40			39-20			19-15		
		♂	♀		♂	♀		♂	♀		♂	♀	
		p	m	s	p	m	s	p	m	s	p	m	s
Mongol fold	P/P.....				1			3	1		6	3	1
	P/G.....							2	1	1	2	3	1
	P/E.....												1
	P/N.....							1					
	P/?.....									1			
	G/G.....												
		-	0	-	-	0	-	-	1	-	-	8	-
		-	13	-	-	10	-	-	4	-	-	-	-
Eskimo fold	P/P.....	1			1	2	1	1	3	5	1	7	8
	P/G.....				2	2			6	3	1	2	5
	P/E.....					1						1	1
	P/N.....								1				1
	P/?.....										1		
	G/G.....							2	1	1	2		1
		-	1	-	-	0	-	-	7	-	-	6	-
		-	21	-	-	21	-	-	30	-	-	9	-
		-	5	-	-	5	-	-	9	-	-	5	-
Indian fold	P/P.....				1		2				1		
	P/G.....							1		1	1		
	P/E.....							2					
	P/N.....												
	P/?.....												
	G/G.....										1		
		-	0	-	-	0	-	-	1	-	-	2	-
		-	3	-	-	4	-	-	4	-	-	0	-
		-	0	-	-	0	-	-	0	-	-	0	-
Uncharac- teristic fold	P/P.....	1					1	3	1		2		1
	P/G.....						1				2	1	2
	P/E.....												
	P/N.....												
	P/?.....												
	G/G.....												
		-	1	-	-	0	-	-	0	-	-	2	-
		-	4	-	-	4	-	-	5	-	-	3	-
		-	2	-	-	2	-	-	4	-	-	2	-
Different fold on the two eyes	P/P.....	1			1	2	1	1	2	4	1	2	
	P/G.....								2	1	1		1
	P/E.....										1		
	P/N.....												
	P/?.....												
	G/G.....							1			1	2	
		-	1	-	-	0	-	-	3	-	-	2	-
		-	10	-	-	10	-	-	8	-	-	1	-
		-	4	-	-	4	-	-	1	-	-	4	-
No fold	P/P.....	10	5		16	20		5		2		1	1
	P/G.....	1			4	1		3		3		1	
	P/E.....	2			2					1			1
	P/N.....				1			1					
	P/?.....						1					1	
	G/G.....	1	2		1	1		1		3			
		14	7		24	23		10		9		3	2

according to age, sex, descent, and fold.

14-10			≥10				Total		Total	%
♂	♀		♂	♀		♂	♀	♂ + ♀		
p m s	p m s		p m s	p m s		p m s	p m s			
						1 5 3	1 6 4	9 + 11	20	
1 2 1	1		1 2 2	4 5 3		3 6 2		12 + 11	23	
						1		1	1	
						1		1	1	
	1						2	2	2	
	1 1	1				1 1	1	1 + 2	3	
- 5 -	- 4 -	- 0 -	- 5 -	5 12 7	7 12 7			24 + 26	50	16.45
1				8 8	1 8 9			16 + 18	34	
2 2	2 3			1 13 7	3 9 6			21 + 18	39	
1				1 1	1 1 1			1 + 3	4	
				1 1				2	2	
1				1	1			1 + 1	2	
				1 2 1	3 3			4 + 6	10	
- 7 -	- 5 -	- 0 -	- 0 -	2 25 18	6 21 19			45 + 46	91	29.93
						1	3	1 + 3	4	
						1	1 1	1 + 2	3	
						2		2	2	
			1			1	1	1 + 1	2	
- 0 -	- 0 -	- 1 -	- 0 -	5	4 2			5 + 6	11	3.62
					4 2	3 2		6 + 5	11	
1				1 2	3 1			3 + 4	7	
- 1 -	- 0 -	- 0 -	- 0 -	1 6 2	6 3			9 + 9	18	5.92
1	1 1 1			3 2 7	1 2 5			12 + 8	20	
1	1 1 3			1 2 3	2 4 1			6 + 7	13	
					1			1	1	
					1 1 3			5	5	
- 3 -	- 7 -	- 0 -	- 0 -	4 4 10	5 7 9			18 + 21	39	12.83
								32 + 28	60	
								9 + 4	13	
								4 + 2	6	
1								3	3	
1								2 + 1	3	
1								4 + 6	10	
3	0	0	0					54 + 41	95	31.25

We found that 24 men and 26 women, a total of 50 persons, had Mongol fold on both eyes, while Mongol fold on only one eye was noted for 10 men and 13 women, a total of 23 persons.

The Eskimo fold was found on both eyes of 45 men and 46 women, a total of 91, on only one eye on 13 men and 17 women, a total of 30.

We found the Indian fold on both eyes of 5 men and 6 women, a total of 11, and on only one eye on 7 men and 5 women, a total of 12.

Epicanthus was only found on one person—and only on one of the eyes.

39 persons have different fold character on the 2 eyes—including the above-mentioned single instance of Epicanthus. 16 persons have double fold.

Further reference is made to Table V, which shows the division of the materials' persons into + and ÷ fold, distributed according to sex and age groups.

Table VI shows the distribution into folds of all groups and indicates whether the fold is pronounced (p), medium (m), or slightly accented (s), arranged by descent, sex, and age.

Table VII registers all the 608 eyes, in relation to descent, age, and sex.

Table VIII shows the distribution of fold characters according to age groups, i.e. persons with the respective fold in relation to a percentage of the total number of persons in the group.

Our materials, 31.25% of which do not have folds, while 16.45% have Mongol fold, 29.93% Eskimo fold, 3.62% Indian fold, 5.92% uncharacteristic fold, and 12.83% different folds on the 2 eyes, thus looks somewhat different from BIRKET-SMITH's (1940), as well as SKELLER's (1954), which are mentioned on p. 20. BIRKET-SMITH did not distribute his material according to different folds; he finds 74% without fold and 26% with fold, and of these only 7% were pronounced, while 19% were slightly developed. He did not find Indian fold.

SKELLER found 91% with clearly marked folds, while the remaining 9% comprises lacking fold, uncharacteristic fold, and a few double folds. In 3 cases only (double-sided in a male, one-sided in a female) he found Indian folds.

As the tables show, we have found a quite significant variation between the 2 eyes, namely in 13% of the investigated persons.

Our material shows, in agreement with all other studies of eye folds, that there is a clear predominance of eye folds in quite young individuals; this diminishes with age, and is almost non-existent in old people. However, we have not found that the fold disappears in the 30–40 age group, as some authors maintain—p. 20.

Another age phenomenon is the increasing furrowing between eyebrows and eyelids. This condition, like the gradual disappearance of the

Table VII. *The material's 608 eyes according to age, sex, descent, and fold.*

		≥ 60		59-40		39-20		19-15		14-10		<10		Total	Total	%
		♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂ + ♀		
Mongol fold	P/P.....			3		11	20	8	5	1	3			23 + 28	51	
	P/G.....					8	7	11	5	10	5		10	29 + 27	56	
	P/E.....						1	2						2 + 1	3	
	P/N.....					2								2	2	
	P/?.....						2				2			4	4	
	G/G.....						1				2	4		2 + 5	7	
				3		21	31	21	10	13	14		10	58 + 65	123	20.23
Eskimo fold	P/P.....	2		9	4	21	35	6	1	2	1			40 + 41	81	
	P/G.....			8		21	17	9	12	9	13			47 + 42	89	
	P/E.....				2		5			2				2 + 7	9	
	P/N.....					2		2						4	4	
	P/?.....						2			2				2 + 2	4	
	G/G.....				7	6	9	2	1					8 + 17	25	
		2		17	13	50	68	17	14	15	14			103 + 109	212	34.87
Indian fold	P/P.....	1		3	5	3	2			1	2			8 + 9	17	
	P/G.....					2	4			1	1			3 + 5	8	
	P/E.....					4								4	4	
	P/N.....															
	P/?.....															
	G/G.....				1		2						2	2 + 3	5	
		1		3	6	9	8			2	3	2		17 + 17	34	5.59
Epicantus	P/P.....															
	P/G.....					1								1	1	
	P/E.....															
	P/N.....															
	P/?.....															
	G/G.....															
						1								1	1	0.17
Uncharacte- ristic fold	P/P.....	2		1	2	8	5	2	4					13 + 11	24	
	P/G.....				2	1	6	4		2				7 + 8	15	
	P/E.....															
	P/N.....															
	P/?.....															
	G/G.....						1		1					2	2	
		2		1	4	9	12	6	5	2				20 + 21	41	6.74
No fold	P/P.....	21	10	32	41	13	4	2	2					68 + 57	125	
	P/G.....	2		8	2	6	6	2	1					18 + 9	27	
	P/E.....	4		4		2		2						8 + 4	12	
	P/N.....			2		2				2				6	6	
	P/?.....				2			2		2				4 + 2	6	
	G/G.....	2	4	2	2	2	7			2				8 + 13	21	
		29	14	48	47	23	19	6	5	6				112 + 85	197	32.40

Tabel VIII. *Age distribution in relation to fold type.*

	Mongol fold		Eskimo fold		Indian fold		Uncharacteristic fold		Different fold on the two eyes	
	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀
<10 years.....	—	100	—	—	100	—	—	—	—	—
10-14 years.....	26,32	25	36,84	31,25	—	—	5,26	—	15,79	43,75
15-19 —	38,46	23,53	34,62	29,41	—	—	11,54	11,76	3,85	23,53
20-39 —	14,29	18,84	37,50	43,48	5,36	5,80	7,14	7,25	17,86	11,60
40-59 —	2,78	—	19,44	17,14	2,78	5,71	—	5,71	8,33	5,71
≥60 years.....	—	—	5,88	—	—	—	5,88	—	5,88	—

fold, is due to dwindling of the fatty tissue. Correspondingly, as already maintained by DREWS (1889), the slight preponderance of fold in women is probably due to a greater abundance of fatty tissue in this region.

Like SKELLER, we have found that the fold manifests itself in extreme old age as Eskimo fold, but we have not found a gradual recession of Mongol fold and a steady increase of Eskimo fold with age. On the other hand, Table VIII shows the quite interesting phenomenon that Mongol fold is much less strongly represented than the other folds in persons over the age of 40. No woman of 40 or older has Mongol fold, and the oldest man with this fold is 54 years old. We find Eskimo fold and uncharacteristic fold on persons as old as in their sixties, but only men.

The relation of the folds to *caruncula lacrimalis*, which has played such an important part in many studies on eye folds is, as mentioned earlier (p. 18), illustrated by the classical English designation: 0-1-2-3 (GARSON & REED, 1892). The caruncula itself is designated at the same time as large (l), medium (m) and small (s), while its shape is described as round (R), which in children and youths can be no more than a dot; triangular (T), common in adults, but more and more beak-shaped in old age (B). Thus, most old persons' caruncula steadily becomes a longer and narrower beak and simultaneously seems to take the place of the original fold; indeed, it can even simulate a fold of this type until more closely analysed. In very old persons this beak can expand into an oval, similar to a spoon-formed lake; this can be faintly reminiscent of a return to the childish *canthus internus*, however without redevelopment of a fold-like formation, but with flow of tears from the shallow *lacus lacrimalis*.

Caruncula lacrimalis's variation and its relation to the fold are shown in Table IX, A and B.

The material is furthermore arranged by families, whereby familial differences with respect to the presence of folds and their type are shown, and thus demonstrate a hereditary tendency. Parents-children-combinations in relation to + ÷ fold appear in Table X.

Table X. *Parents-children-combination in relation to eye folds (+ and ÷ fold).*

Father - Mother			No. of Families	Children +	Children ÷	Children Total
+	+	.....	10	18	1	19
+	÷	.....	5	9	3	12
÷	+	.....	8	27	0	27
÷	÷	.....	15	49	12	61
+	dead	.....	4	10	1	11
dead	+	.....	8	12	1	13
÷	dead	.....	12	26	4	30
dead	÷	.....	7	13	4	17
Total			69	164	26	190

B. Eye Fissure (*rima palpebralis*)

The Eskimos' and the Mongolians' eye fissures are narrower than the Europeans', and are also slightly more oblique, even though there doubtless are other things than the fissure which give us the impression of "slant eyes" in these faces, namely, the fold, the fatty tissue in the eyelids, the prominent cheek bones, and the lack of a depression between the eyebrow and the eyelid's border.

GIFFORD (1928) states, however: "The belief in the obliquity of the Mongolian eye has been fostered by the traditional fondness of Mongolian artists and actors for this style of fissure. These actors increase to produce obliquity of the fissure by artificial devices; and they still further exaggerate the impression of obliquity by painting in an upward and outward extension of the eyebrows. Moreover, obliquity is readily noticed when it occurs in a narrow fissure of the surface of a flat face; while it easily escapes notice when worn in a recessed eye with a wide fissure" (p. 892). Undue emphasis shall not be placed on the part of the very oblique or on the strictly horizontal fissures, but it is demonstrable that the narrow, hemi-oval to slit-like fissure with an almond shaped tendency is, because of the fold and the fatty tissue at least as characteristic of the Mongolian and the Eskimo eye as the obliquity.

With respect to the eye fissures' registration, we have used the same system of registration as that used on the Danish expeditions to Central Asia, namely, round, oval, hemi-oval and slit-like, (Colour Plate III). Moreover, the fissure is registered according to its direction; thus the line of the fissure running obliquely from *canthus internus* upward/outward is indicated by a¹, the opposite by a³, and horizontal by a².

Our material comprising 304 persons includes 69 = 22.70% with round eyes, 44 women and 25 men, accordingly, a very clear preponder

Table XI. *Form of the Eye Fissure.*

		≥60		59-40		39-20		19-15		14-10		<10		Total	Total	%
		♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂+♀		
Round	P/P.....	1	4	7	3	6	2	2	1					10+16	26	
	P/G.....				1	8	5	4		3				6+15	21	
	P/E.....			1	2	1	1	1						3+3	6	
	P/N.....				1									1	1	
	P/?.....					1								1	1	
	G/G.....			2	3	7			1		1			5+9	14	
		1	4	10	10	23	8	7	2	3	1			25+44	69	22.70
Oval	P/P.....	6	2	16	10	19	20	5	3	1	3			47+38	85	
	P/G.....			8		16	9	7	5	8	6	2		39+22	61	
	P/E.....			2			3			1				3+3	6	
	P/N.....			1		1				1				3	3	
	P/?.....					1	1			1				1+2	3	
	G/G.....	1	2	1	3	1	2	1	1	1	2			5+10	15	
		7	4	28	13	37	25	14	9	12	12	2		98+75	173	56.91
Hemi-oval	P/P.....	5	1	3	8	5	5	1	1					14+15	29	
	P/G.....	1			2	2	3	1		2	1	3		6+9	15	
	P/E.....															
	P/N.....							1						1	1	
	P/?.....									2				2	2	
	G/G.....					1								1	1	
		6	1	3	10	7	9	3	1	4	1	3		23+25	48	15.79
Slit-like	P/P.....	2	1	1	1	1	2	1						5+4	9	
	P/G.....									1				1	1	
	P/E.....	2												2	2	
	P/N.....					1								1	1	
	P/?.....			1										1	1	
	G/G.....															
		4	1	1	2	2	2	1		1				9+5	14	4.60

ance of women in this group. There is a corresponding preponderance of men in the group with oval eyes which comprises 173 persons, divided into 75 women and 98 men, or 56.91% of the total number of persons. 48 persons, 25 women and 23 men = 15.79% have hemi-oval eyes, equally divided by sex.

5 women and 9 men, a total of 14 = 4.60% have slit-like rima.

Registration of the fissure's shape in relation to age, sex, and descent appears in Table XI.

With respect to the line of the eye fissure, which is determined by means of measurements in relation to the horizontal plane on physiological photographs—and not simply by means of spontaneous visual

Table XII. *Direction of the Eye Fissure.*

		≥60		59-40		39-20		19-15		14-10		<10		Total	Total	%
		♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂+♀		
a ¹	P/P.....	4	1	8	6	4	13	2	4	2	2			20+26	46	
Oblique upwards	P/G.....					4	7	6	4	4	7	3		14+21	35	
	P/E.....			1	1			1						1+2	3	
	P/N.....					1		1						2	2	
	P/?.....						1			1	1			1+2	3	
	G/G.....			2		6								8	8	
			4	1	8	9	10	27	9	9	7	10	3		38+59	97	31.91
a ²	P/P.....	9	4	13	19	21	20	7	2		1			50+46	96	
Horizontal	P/G.....	1		8	2	15	13	6	5	6	3	2		36+25	61	
	P/E.....	2		2		1	4	1		1				7+4	11	
	P/N.....			1		2				1				4	4	
	P/?.....				1	1	1	1	1	1				2+2	4	
	G/G.....	1	2	1	3	4	4	1	1	2	2	1		10+12	22	
			13	6	25	25	43	42	16	8	11	6	1	2	109+89	198	65.13
a ³	P/P.....			3	1	3								6+1	7	
Oblique downwards	P/G.....							1		1				2	2	
	P/E.....															
	P/N.....															
	P/?.....															
	G/G.....															
				3	1	3		1		1				8+1	9	2.96

impressions—our results may at first seem surprising to most people; yet this is scarcely possible if GIFFORD's (1928) clear statements are kept in mind.

We found that 89 women and 109 men, a total of 198 persons = 65.13% had horizontal fissures.

The group having eye fissures going obliquely upward showed a clear preponderance of women, namely, 59 women against 38 men, a total of 97 persons = 31.91%.

Fissures pointing obliquely downward were found on 8 men and 1 woman, a total of 9 persons = 2.96%. The detailed registration appears in Table XII.

C. Eyebrows

The Polar Eskimos' eyebrows are registered according to shape and are thus divided into 3 main groups: hemi-circular (h), flat curved (f), and triangular (t). In the literature on this subject eyebrows are distributed into up to 10 groups by shape, but this seems inappropriate and

Table XIII.

		≥60			59-40				39-20				19-15										
		♂	♀		♂	♀		♂	♀		♂	♀		♂	♀								
		a	m	s	a	m	s	a	m	s	a	m	s	a	m	s							
Triangular t	P/P.....	4	7	2	1	1	14	8	1	3	11	8	15	10	4	17	3	1	7	1	5		
	P/G.....		1			2	2	1			1	4	14	1		13	2	4	6		3		
	P/E.....		2			1	1					1				1	1						
	P/N.....											3											
	P/?.....															2							
	G/G.....		1		1	1	1			1	4	1	3			5	4		1				
		17			4		31			28		52		52		19		9					
Flat curved f	P/P.....				1	1			3	1	1	2		3	5	1	1						
	P/G.....						1			1				1	3	1		3			5		
	P/E.....							1				1			2			1			1		
	P/N.....						1												1				
	P/?.....									1									1				
	G/G.....														1							1	
		0			1		3			7		4		17		7		7					
Hemi-circular h	P/P.....				2																		
	P/G.....						2														1		
	P/E.....																						
	P/N.....																						
	P/?.....																						
	G/G.....																						
		0			2		2			0		0		0		0		0		1			

a = abundant; m = medium; s = spare.

insufficiently clear for the purposes of our study (GERHARDT, 1954; MARTIN, 1961).

The strength and abundance of growth of the eyebrows' hair is likewise graduated with the designations spare (s), medium (m), and abundant (a).

It is scarcely possible to avoid remarking that the Polar Eskimos have triangular eyebrows to a really predominant degree; thus the shape is almost that of a rightangled triangle with the right angle placed laterally and upwards, (Colour Plate III, no. 3.) The registration appears on Table XIII, which shows that the shape of the eyebrows on the 304 examined persons is distributed as follows:

239 (79%) are triangular

59 (19%) — flat curved

6 (2%) — hemi-circular

Thus, with respect to shape there is significant disagreement with SKELLER's results from Angmagssalik, where he found that a predom-

Eyebrows.

14-10		<10				Total		Total	%
♂	♀	♂	♀	♂	♀	♂ + ♀			
a m s	a m s	a m s	a m s	a m s	a m s	a m s			
1 1	3			3 4	3 3 4	8 3 7 12	71 + 57	128	
8 1	6 2		2	10 3 1	3 2 4 5	4 4 + 29	44 + 29	73	
1					3 3	1 1	1 + 1	8	
					3		3	3	
1	1				1	3	1 + 3	4	
				2 4	1 7 9		7 + 16	23	
13	12	0	2	46 75 11	8 72 27		132 + 107	239	78.62
				3 2	3 8 3		5 + 14	19	
1 1	2		3	5 1	1 13 2		6 + 16	22	
				2	1 3		2 + 4	6	
1				2 1			3	3	
1				2		1	2 + 1	3	
2	1	1		2 1	3		3 + 3	6	
6	3	1	3	3 15 3	5 27 6		21 + 38	59	19.41
						2	2	2	
					2	1	2 + 1	3	
	1					1	1	1	
0	1	0	0	2	1 3		2 + 4	6	1.97

ant part of the 171 investigated men and 205 investigated women (99.1% and 98.5% respectively) had flat curved eyebrows, while the even sexual distribution with respect to the shape and the somewhat more abundant growth in men is the same in both materials.

As to the shape of the eyebrows there apparently is no clear differential by age, nor was this to be expected, as the natural partings and the direction of the hair, which determine the shape of the eyebrows, are constant at all ages (BREITINGER, 1955). We shall not go into detail here concerning the description of hair and growth characteristics; yet, regarding eyebrows, it is noted that they belong to the group of secondary hair and represent a specific human development, which, with respect to shape, colour and abundance displays differences within the ethnic groups and also shows individual differences. In identical twins the formation of the eyebrows is almost entirely concordant, even in the smallest details (JANCKE, 1941).

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Appendix

Ear Lobe form (*Lobulus auricularae*)

The outer ear varies to an extraordinary extent from individual to individual; therefore, like hand and fingerprints it is used for purposes of personal identification.

The ear lobe, *lobulus auricularae*, is neogenetic in man, but also occurs in a rudimental form in anthropoids, especially chimpanzees. Its development is most pronounced in long-eared persons.

The attached ear and the semi-detached (middle) form correspond to an embryonic stage in the development of the ear, while the ear lobe already begins to form in the third fetal month.

According to anthropological texts, the "primitive form" with the attached ear is said to occur most frequently in Mongols, while lobe formation is most pronounced in Europeans, where it is more prevalent in females than in males, (MARTIN, 1961).

In registering our material, which comprises 304 persons, we used the same method as that employed by the 3rd Danish Expedition to Central Asia (p. 11):

1. + lobule
2. middle form (running slightly horizontally, with no attachment, but consequently without lobe)
3. ÷ lobule (completely attached, slanted)

Our investigation reveals a clear minority of + lobule, namely, in a total of 30 persons (23 males and 7 females) = ca 10%, while 120 (48 m and 72 f) = 40% have ÷ lobule.

The largest group is middle form, namely, 154 (84 m and 70 f) = ca 50%.

Seen from an ethnic point of view this corresponds more or less with general opinion; it is interesting to compare our results with those from the 3rd Danish Expedition to Central Asia, according to which about 60% of the Tibetans have a middle form, while 20% have lobes and 20% have no lobes (p. 25).

Our registration does not show female preponderance with respect to lobe formation as by Europeans; the result is quite the opposite.

Only 4 P/P (pure Polar Eskimos) have + lobule. Of these 2 are male cousins, and the 2 others are siblings (brother and sister).

Registration with respect to descent and sex is shown on Table XIV.

Table XIV. *Ear Lobule.*

	1. + lobe			2. middle form			3. ÷ lobe		
	♂	♀	total	♂	♀	total	♂	♀	total
P/P.....	3	1	4	39	29	68	34	43	77
P/G.....	14	3	17	26	28	54	12	15	27
P/E.....	0	1	1	7	1	8	1	4	5
P/N.....	0	0	0	5	0	5	1	0	1
P/?.....	1	0	1	2	1	3	0	3	3
G/G.....	5	2	7	5	11	16	0	7	7
	23	7	30	84	70	154	48	72	120
%.....	9.9%			50.7%			39.4%		

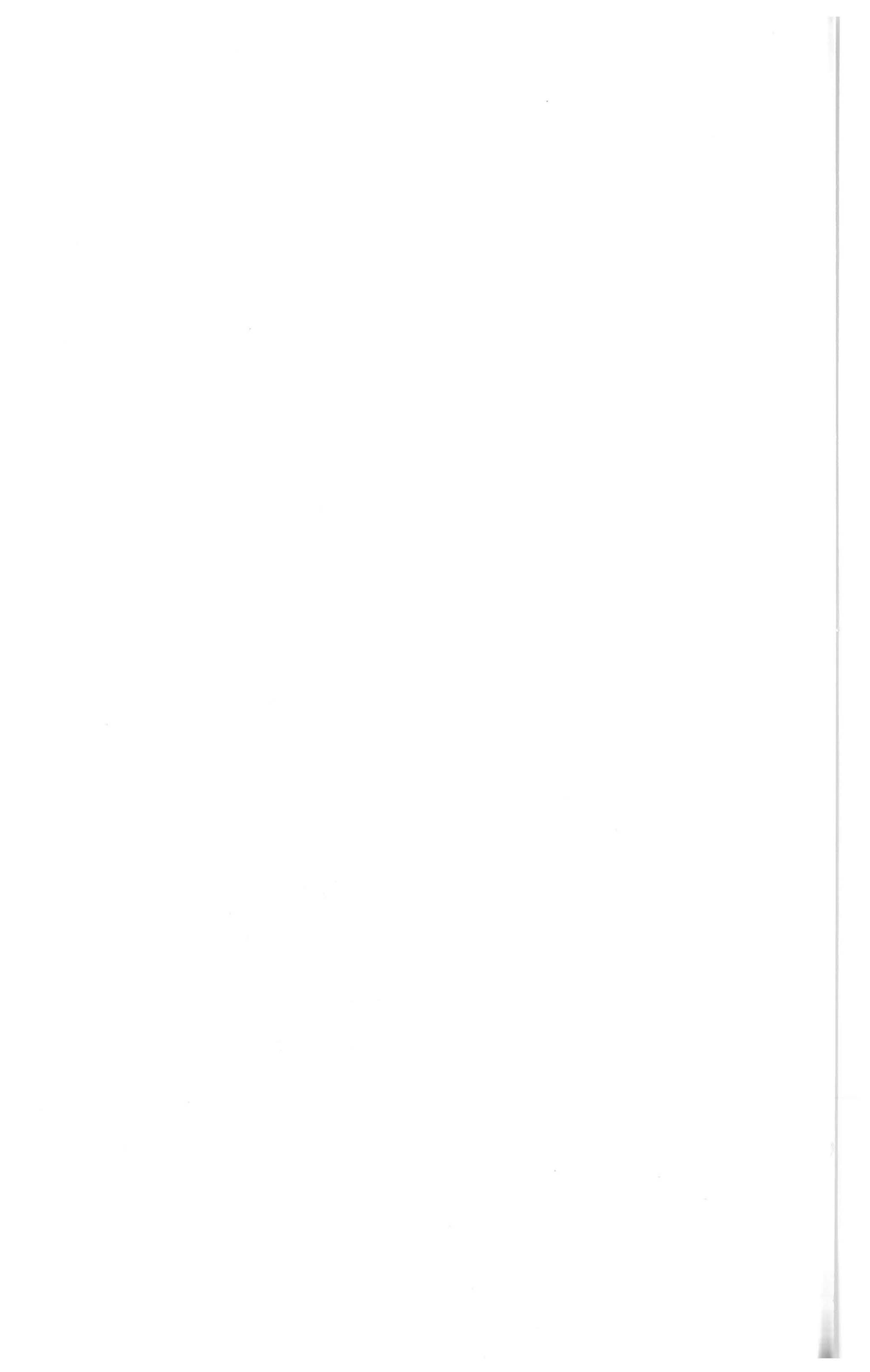
Table IX A: *Caruncula—men.*

♂	≥60			59-40			39-20			19-15			14-10			<10		≥60 - <10			Total	%
	R l m s	T l m s	B l m s	R l m s	T l m s	B l m s	R l m s	T l m s	B l m s	R l m s	T l m s	B l m s	R l m s	T l m s	B l m s	R l m s	T l m s	B l m s				
0	P/P.....		7 2 1	1 1 1	7 5 1		1		3 2		1							2 1 1 1 17 9 2	33			
	P/G.....		1		1 2 1			2 1		1								4 1 1 2 1	9			
	P/E.....		1 1		1 1									1				2 1 1	4			
	P/N.....				1			1						1				1 1 1	3			
	P/?.....												1					1 1	2			
	G/G.....			1		1			1					1				1 2 1	4	35.5		
1	P/P.....	1			1 4 1 1 1			7	3		1							2 12 1 1 4	20			
	P/G.....							1 1 1 1		1					1			1 1 1 1 3	8			
	P/E.....							1										1	1			
	P/N.....							1										1	1			
	P/?.....																					
	G/G.....																				19.3	
2	P/P.....		2					1 1	4 5		1 1	1 3		1 1				2 2 6 9 2	21			
	P/G.....				2				3 9		1	2 6		1	5			2 7 20	29			
	P/E.....								1			1		1				1 2	3			
	P/N.....								1			1						2	2			
	P/?.....													1				1	1			
	G/G.....								2 1			1			1			2 3	5	39.4		
3	P/P.....							1			1							2	2			
	P/G.....										2			4				6	6			
	P/E.....																					
	P/N.....																					
	P/?.....																					
	G/G.....															1		1	1	5.8		
			1	16	1	11	24	5	41	10	6	19	1	5	12	2	1	18	84	53	155	
			17			36			56			26			19			1		155		

Table IX B: *Caruncula—women.*

♀	≥60			59-40			39-20			19-15			14-10			<10		≥60 - <10			Total	%					
	R l m s	T l m s	B l m s	R l m s	T l m s	B l m s	R l m s	T l m s	B l m s	R l m s	T l m s	B l m s	R l m s	T l m s	B l m s	R l m s	B l m s	R l m s	T l m s	B l m s							
0	P/P.....	1	3	1	1	2	8	8			2		1						1	3	1	11	11	27			
	P/G.....							1		2			1								2	3		5			
	P/E.....									1												1		1			
	P/N.....																						1	1			
	P/?.....																					1	2	2	6	26.8	
	G/G.....		1	1					1	1	1																
1	P/P.....					3		1		4	2	1	1								1	7	2	1	2	13	
	P/G.....							1		1				1								3		2		6	
	P/E.....					1				1												2				2	
	P/N.....																					1				1	
	P/?.....									1												5	1	1		7	19.5
	G/G.....					2	1	1			3																
2	P/P.....					2	1			4	6	10	1		1	2	1				4	1	11	14	1	31	
	P/G.....									3	4	3	1		2		4				1	10	4	11	1	26	
	P/E.....										1	1											1	1		2	
	P/N.....											1											2			2	
	P/?.....										1											1	2			6	45.0
	G/G.....							1	1	1	1			1							1	2	1	2		6	
3	P/P.....									1				1									2			2	
	P/G.....					1					2				2						4		10			10	
	P/E.....																										
	P/N.....																										
	P/?.....																							1		1	8.7
	G/G.....																										
		1	6		13	22		10	47	12		2	15		6	10				5	18	91	40		149		
		7			35				69				17			16				5		149					

PLATES



Iris colour



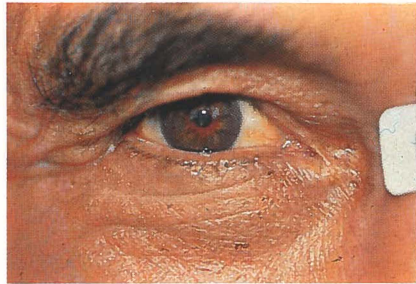
1. Dark brown



2. Brown/grey-brown



3. Brown



4. Brown/grey-blue



5. Light brown



6. Brown/blue-blue

Eye Folds



1. Mongol fold



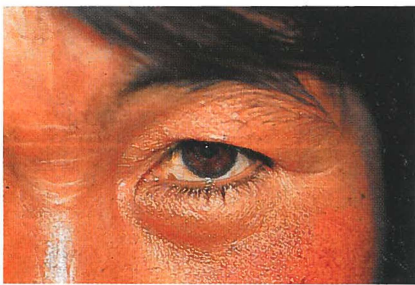
2. Double Mongol fold



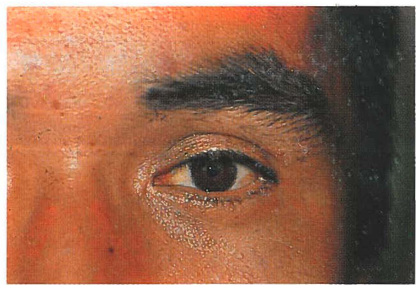
3. Eskimo fold



4. Double Eskimo fold

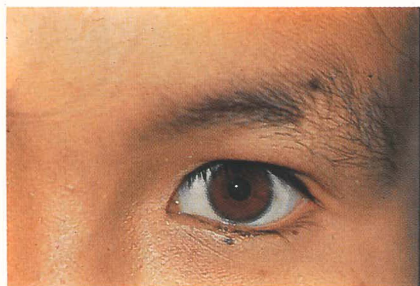


5. Indian fold



6. Epicanthus

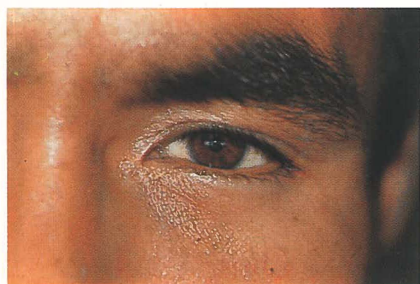
Rima palpebralis



1. Round



2. Oval and flat curved eyebrow



3. Hemi-oval and triangular eyebrow



4. Slit-like