Anatomy — *Stability and variability of Central- and Paleo-Asiatic index peaks and some remarks on the Greenland Eskimo.* By C. U. ARIËNS KAPPERS.

(Communicated at the meeting of June 29, 1935).

In a preceding paper [1]) I called the attention to the fact that in Central Asia and west of the Central-Asiatic mountain barrier the occurrence of the associated 83—86 cephalic (82—85 cranial) index peaks is very frequent and may be traced via Asia, Minor, Bosnia, Tirol, Switzerland, the ancient Alsace, and Auvergne to the English Round Barrow skulls [2]). Considering the data published in the studies of HERVÉ [3]) and SCHEIDT [4]) it seems that this race already occurred in Europe shortly after the upper paleolithic period [5]) in Azilian times, and was quite numerous in early neolithic times, when the post-glacial climate was followed by milder temperatures and new peoples may have migrated from Eastern countries to Western Europe.

In the same paper I mentioned that of the usually associated 83—86 index peaks either the 86 or, more frequently, the 83 peak may become so dominant that it is practically the only one. So with the Mesopotamian Yesidis, measured by the KRISCHNERS (l.c. infra), the 83 peak is practically the only outstanding one; with the Mongol Torgout skulls, measured by IWANOWSKY, the 85 cranial (86 cephalic) peak [6]).

Furthermore it was pointed out that sometimes in groups of the 83—86 index people an additional ultra-brachycephalic index peak occurs at

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[1]) The Central-Asiatic Barrier and the distribution of associated index peaks in Asia and Europe. Proceed. of the Kon. Akad. v. Wetensch. Amsterdam, Vol. **37**, 1934, p. 602.

[2]) I may add to this that a curve of the cephalic indices measured by Dr. Argelliès of Basques from St. Jean de Luz, published by BROCA (Bull. Soc. d'Anthr. de Paris T. III, Série II, 1868, p. 13), shows the same peaks (contrary to MORANT's Spanish Bask skulls), and also the old Dutch Zeeland skulls measured by BOLK.

[3]) HERVÉ. Les Brachycéphales néolithiques. Revue d'Anthropologie, Tome **4**, 1894, p. 393 and Tome **5**, 1895, p. 18.

[4]) SCHEIDT. Die eiszeitlichen Schädelbefunde aus der grossen Ofnet-Höhle und vom Kaufertsberg bei Nördlingen. Lehmann, München, 1923.

[5]) Of the upper paleolithic skulls only skull II of Solutré has an index of 85, corresponding with a cephalic index of 86. See MORANT: Studies of paleolithic man N^0. IV, A biometrical study of the upper paleolithic skulls of Europe. Annals of Eugenics, Vol. IV, 1930, and Table II, fig. 23.

[6]) With the Uzbeks, Lesghians and Turks the cephalic 86—7 index is by far prevailing over the 83 indices. See KAPPERS and PARR, An introduction to the Anthropology of the Near East in ancient and recent times. Noord Hollandsche uitgeversmaatschappij, Amsterdam, 1934, fig. 17.

89—90, that has to be considered as a mutation caused by special, probably environmental or endocrine circumstances. This ultra-brachycephalic peak more often occurs in such people in which the 86 peak prevails over the 83 peak.

In the above-mentioned paper I also pointed out that east of the Asiatic barrier the (78)79—81(82) peaks are very frequent and the 83—86 combination rarer. The Paleo-Asiatic (78)79—81(82) combination, however, is spread over the whole of Asia, including Western Asia and Europe.

The index combination of these peaks may also specialize in either of its components. So whereas the Dutch males measured by FRETS [1]) have a 79 and 81 peak, his Dutch females only show a 81 peak. On the other hand an isolated 79 peak is found with the Norvegians, Vlachian Bulgarians, and some other so-called Nordic races.

Naturally there are also groups or peoples containing both the Central- and the Paleo-Asiatic components. So index curves in which both the Paleo-Asiatic and the Central-Asiatic peaks occur are seen in the curves of the Chukchee, the Rjasan Russians of TSCHEPOURKOWSKY, and in some other curves published in my preceding paper.

An equally balanced occurrence of both sets of peaks is shown by the Jeminite Arabs [2]) (Table I, N°. 1). Comparison with curve N°. 2 shows that the Central-Asiatic peaks do not occur with my Palestinean Arabs, who only have the 79 and 81 peaks. Indeed, a more or less equally balanced occurrence of both sets of index peaks is so rare, in Asia as well as in Europe [3]), that one would not be inclined to believe that in the same race a transmutation of the Paleo-Asiatic index curve into the Central-Asiatic one or vice versa might occur.

Yet, it is a priori probable that these two large Eurasian stocks are related at their roots and that both the meso-subbrachycephalic (79—81) and the brachy-hyperbrachycephalic (83—86) Eurasian types at some time of evolution have arisen from a common stock. Furthermore it is most likely that the 83—86 index type is the later in development, the oldest races of humanity being meso- or dolichocephalic. Besides, OSBORN and GREGORY have shown that even in the animal series brachycephaly is a later evolutional feature (personal communication by Prof. GREGORY).

I may add to this that the index curves of other continents (and islands) give me the conviction that an immigration of the 83—86 peak people from outside Eurasia is absolutely excluded. The African, Indonesian, and Polynesian curves in which the 83—86

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[1]) FRETS. Heredity an the Headform in Man. Genetica, Vol. III, 1921, p. 193. — and The same: Heredity and the cephalic index, Diss. Amsterdam, 1924.

[2]) This curve contains the same indices as fig. 23 of PARR's and my book, to which are added those recorded by CIPRIANI. Arch. per l'Antrop. e per l'Etnologia, Vol. **60—61**, 1930.

[3]) In Europe I found it indicated only with the Zürich girls, measured by GRÜTZNER (see my paper in these Proceed., Vol. **37**, 1934, Table III, N°. 9).

peaks occur have to be explained by Asiatic influences (for the American Indians see below).

Also the occasional occurrence of an ultra-brachycephalic 88—89 cranial or 90 cephalic peak with the 83—86 groups shows the variability of the index under certain circumstances. This makes it possible that the 83—86 peak-index people may arise from a 79—81 people.

Nevertheless, examples showing a partial mutation of the 79—81 peak group into an 83—86 peak group cannot be demonstrated with certainty in Asia.

It is remarkable, however, that a partial reversion of the 83—86 index curve to a 79—81 index curve may be demonstrated with such a high degree of certainty that this alone is sufficient to show the genetic relationship between the Paleo-Asiatic and Central-Asiatic index people or, at least, index curves.

This is the more surprising as such a reversion seems to be against DOLLO's law. However, I may quote here GREGORY's [1]) paper read at the London Congress of Anthropologists and Ethnologists, to show that I am not the only one in contesting such a strict interpretation of this law, not even meant by DOLLO himself.

That a partial reversion of the Central-Asiatic index curve to a Paleo-Asiatic may occur appears to from the data published by F. BOAS [2]), GUTHE [3]) and HIRSCH [4]) who showed that the average cephalic index of the American born children of foreign born Jews and Armenians is lower than the average index of their parents. That this lowering depends on a change of the parental Central Asiatic curve in a prevailing Paleo-Asiatic one with the children appears from the following facts:

Starting with BOAS' work on European (Russian) born Jews and their American born children, I give the frequency curves of these groups in Table I, N°. 3, each curve being on 1000 indices. From this figure it appears that the peak of BOAS' Russian born Jews is at 83, a typical Central Asiatic index peak. With their American born sons, however, the peak is at 81, a typical peak of the Paleo-Asiatic (78)79—81(82) group.

Comparing both curves we find that the change in shape of that of the sons is chiefly due to a decrease of the number of 84 and higher indices and an increase of the 82 and lower indices. It is remarkable that the percentage of 83 index people has remained about the same. I shall return

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[1]) GREGORY. Man's place among Primates. Compte-rendu du Congrès international des Sciences Anthropologiques, Londres, 1934, p. 70.

[2]) F. BOAS. Abstract of the report on changes in bodily form of descendants of immigrants. Government printing offices Washington, 1911. *The same,* Kultur und Rasse. Leipzig, 1914.

[3]) GUTHE. Notes on the cephalic index of Russian Jews in Boston. Am. Journ. of Physical Anthropology, Vol. I, 1918.

[4]) HIRSCH. Researches on the cephalic index of American born children of three foreign groups. Am. Journ. of Phys. Anthropology, Vol. **10**, 1927.

later to the greater stability of the 83 index compared with the 86 and higher indices.

Still more convincing for my thesis is the result obtained by GUTHE with the Russian born Jews and their American born descendants of Boston, whose index curves are reproduced in Table I, figs 4, 5, 7 and 8.

Fig. 4 is a reproduction of GUTHE's cephalic index curve of Russian born male Jews living in Boston. The Central Asiatic character of this curve is still more evident than with BOAS' foreign born Jews, as both the 83 and 86 index occur in it. Yet, also with GUTHE's foreign born male Jews the number of 83 indices is by far the most outstanding.

Fig. 5 gives the index curve of the American born sons of the fathers registered in fig. 4. — In fig. 5 the two Paleo-Asiatic peaks 79 and 81 appear [1]). Here we see again the greater stability of the 83 index compared with the 84 and higher indices, especially the 86 index.

Whereas the 83 index people among GUTHE's American born Jews, show a reduction of 1,8 % only and in BOAS' curve the reduction of 83 indices is still smaller (0,2 %), in both cases, the reduction of the 84 and higher indices is very great, especially of the 86 index which in BOAS' curve shows a reduction of 62,5 %, in GUTHE's curve of 72 % even. In GUTHE's curve of foreign born Jews the 86 index shows a distinct peak, in his American born Jewish curve a valley.

Similarly as with BOAS' American born sons, the number of 81 indices shows a striking increase with GUTHE's American born Jews and so does the 79 index, that shows a valley in GUTHE's foreign born curve but a peak with his American born Jews [2]).

Consequently from BOAS as well as from GUTHE's data it appears that the lowering of the average cephalic index in the American born sons is due to a decrease of the Central-Asiatic indices while the Paleo-Asiatic indices increase with the American and West-European born Jews. This teaches us two things: 1. that the Central-Asiatic indices may partially revert to Paleo-Asiatic ones. 2. that of the Central-Asiatic peaks the 83 peak is the most stabile, more stabile than the 86 peak.

This again agrees with what we saw about the ultra-brachycephalic (90) Central-Asiatic peak, which may and may not occur in groups of the same people, thus showing its lability and its influencibility by environmental-endocrine circumstances. The greater stability of the 83 peak, however, confirms the dominant character of brachycephaly (cf. also FRETS), while hyper- and ultra-brachycephaly apparently are far less dominant in heredity, the latter even strongly recessive.

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[1]) HIRSCH's American born male Jews show an intermediate peak, at 80.

[2]) Table I, N°. 6, shows that analogous peaks occur among the Askenasim Jews of Francfort a/M and Cologne, measured by WEISSENBERG (79), and among the Askenasim Jews my collaborators and I measured at Amsterdam (81). Cf. WEISSENBERG: Zur Anthropologie der Deutschen Juden (Zeitschr. f. Ethnologie, Bnd. **44**, 1912), and fig. 31 of our Introduction to the Anthropology of the Near East in ancient and recent times, Amsterdam 1934.

This also explains the fact resulting from Dr. and Mrs. KRISCHNER's [1]) work on Mesopotamia, viz. that the 86 index (together with the 83 index so typical for the Armeno-Chaldean-Assyrian population of Mesopotamia) disappears almost entirely with the Yesidis and Moslim Arabs of that country, while the 83 peak remains.

Having demonstrated the data concerning Jewish males by BOAS' and GUTHE's work, I shall discuss the data concerning the females given by GUTHE and HIRSCH. Table I, fig. 7 shows that with GUTHE's [2]) foreign born Jewish mothers the Central-Asiatic 85—6 and 88 peaks are the highest.

The indices of the American born Jewesses (arranged in Table I, fig. 8) show that HIRSCH' American born Jewesses only have a Paleo-Asiatic 82 peak (the female correlate of the malt Paleo-Asiatic 81 peak) occurring also in GUTHE's female American born Jewesses, who in addition have kept smaller Central-Asiatic peaks at 85—6 and 88. Consequently also with the Jewesses the decrease of the index takes place at the expense of the Central-Asiatic indices, especially at the expense of the higher index. Whereas the 85 peak in the foreign born is 14,5 % of the whole group and in the American born 12,5 %, this relation in the 88 peak is 14,5 to 8,5 %. The increase of the Paleo-Asiatic 82 index in the American born Jewesses is, however, from 10 % in the foreign born to 18,5 % in GUTHE's American born and in HIRSCH's material it was perhaps still higher [2]).

The same phenomenon as with the Jewish immigrants may be concluded from the BOAS' [3]) data concerning the Armenian immigrants. Since the amount of Armenian material examined by BOAS is only small, I made one curve of both sexes of his foreign born Armenians and one of both sexes of their American born children, expressing each set in percentages.

The dotted curve of fig. 9 gives the indices of 34 foreign born Armenian fathers and mothers, the continuous curve the indices of their 24 adult children, male and female, expressed in percentages.

Comparing the curves in fig. 9, we find that also with his American born Armenians there is a decrease of hyper-brachycephalic indices. The interesting ultra-brachycephalic 90 index, so conspicuous with his foreign born Armenians, even fails entirely among the American born.

On the other hand, the increase of the Paleo-Asiatic 82 and especially that of the Paleo-Asiatic 79 index is very evident with the adult American born Armenians.

I cannot leave this subject without analysing by this method also the American and foreign born Neapolitans.

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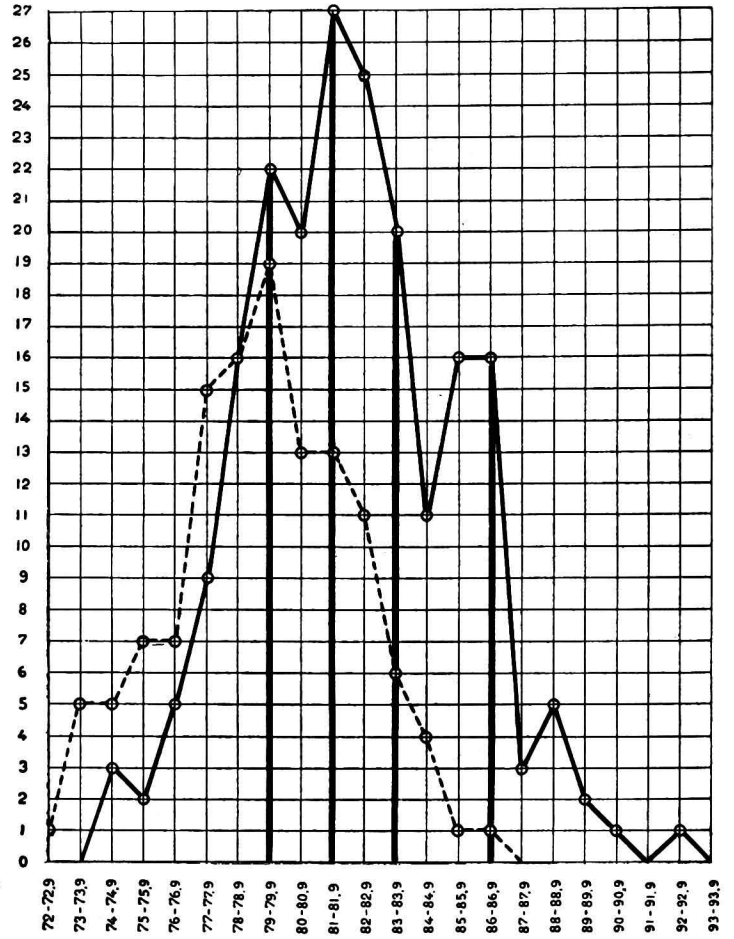
[1]) Dr. H. and Mrs. M. KRISCHNER. The Anthropology of Mesopotamia and Persia. A. Armenians, Chaldeans, Suriani (or Aissori), and Christian Arabs from Irak. B. Yesidis and (Moslim) Arabs from Irak with some remarks on Kurds and Jews. Proceed. Kon. Akad. v. Wetensch. Amsterdam, Vol. **35**, 1932, p. 205.

[2]) Unfortunately HIRSCH does not give the individual data of the foreign born Jewish mothers, only those of the American born daughters.

[3]) F. BOAS. Bemerkungen zur Anthropometrie der Armenier. Zeitschr. f. Ethnologie. Jhrg. 1924, p. 74 (l.c. p. 78 and 79).

Unfortunately BOAS' individual data of his Neapolitans and Sicilians were not accessible to me, so that I can only say something concerning the results obtained by HIRSCH with American born Neapolitans.

In Table I fig. 10 his female American born Neapolitans are indicated by a coambed, his male American born Neapolitans by the thin continuous curve. The thick continuous curve gives the indices of LIVI's males born in the Campania (province of Napels), recorded by F. and H. BOAS [1]). Among the latter, in addition to the Paleo-Asiatic 79 and 82 peaks [2]),



[1]) F. and H. BOAS. The head form of the Italians as influenced by heredity and environment. Am. Anthrop., Vol. **15**, 1913. Contrary to the Neapolitans the Sicilians, according to BOAS, show a slight increase of the index, when born in America.

[2]) It is not strange that the present so-called Mediterranean people has a prevailing Asiatic index since already before the 10th century B.C. Eurasian "Nordics" started to flood the Northern shores of the Mediterranean, the population of which gradually became more influenced by the North than by Africa and the Mediterranean islands, as is especially conspicuous in the anthropological history of Greece.

there are a good many 84 and higher indices. There also is an 86 peak and even a small ultra-brachycephalic (89—89,9) peak in the Italian born curve.

In the American born Neapolitans the Paleo-Asiatic 78(79)—82 indices, however, are far more numerous than in LIVI's curve.

Before leaving the comparison of parental indices with those of their offspring I refer to the adjoining textfigure, made after the data recorded by FRETS (l.c. supra 1921, Table XII and XIII). The continuous line in this figure gives the indices of Dutch males, whose fathers and mothers had indices varying between 80 and 89. We see that — although with their sons the number of 83 and 86 (5) indices is still very considerable — the index peaks 79 and 81 are the highest. The dotted line in the same lurve shows the indices of Dutch males, whose fathers and mothers had indices varying between 80 and 66. In this group the stability of 79 index peak is very striking.

American Indians.

In connection with the facts mentioned above the question arises: What about the most ancient immigrants of America, the Indians? That apart from other admixtures, in South America chiefly, the great majority of the ancestors of the North- and South American Indians have reached this continent from Asia is generally accepted nowadays.

Naturally these immigrants largely come from the North-Eastern part of Asia, where the Paleo-Asiatic races prevail even at the present time, as appears from the 78(79)—81(82) index peaks among the Chukchee, Koryaks, Yakughirs, and Kamschadales and even among the Chinese and Japanese (see my preceding paper in these Proceedings).

Only few groups, partly living in Western partly in Eastern Asia, especially the Buriates, have an outstanding Central-Asiatic index curve, while small admixtures of this index type to the Paleo-Asiatic type occur with the Chukchee and with the Kamschadales recorded by JOCHELSON-BRODSKY.

The relationship of the present American Indians, not only with the Eastern Asiatics in general but with definite Eastern-Asiatic groups-such as the Chukchee, Yakughirs, Koryaks, and Ainos, has been emphasized already by WISSLER[1]) and BOAS[2]), and others, also on ethnological and linguistic grounds.

In this paper I shall only discuss a few curves of American Indians, based on the data published by BOAS (l.c. infra), HRDLICKA (l.c. infra), and other

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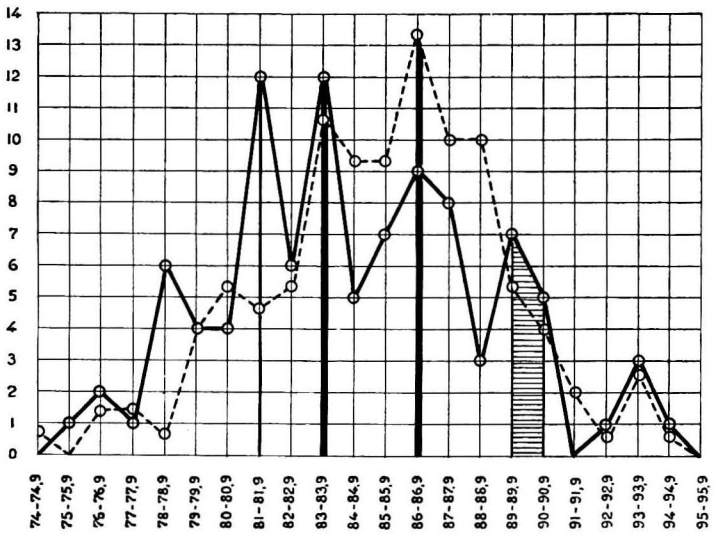
1) CL. WISSLER. The American Indian, sec. ed. Oxford University Press 1922.

2) F. BOAS. Relations between N.W. America and N.E. Asia in: The American Aborigines, their origin and antiquity, a collection of papers by ten authors assembled and published by DIAMAND JENNESS for the 5th Pacific Science Congress, Toronto Press 1933, p. 357. See also N. C. NELSON, The antiquity of man in America in the light of Archeology. Ibidem, p. 87.

authors, that confirm this point of view and show that in addition to Paleo-Asiatic also Central-Asiatic groups have migrated to America.

It seems that the brachy-hyperbrachycephalic (83—86 index) groups have migrated chiefly via the Aleutian Islands, and the meso-subbrachy-cephalic (79—81 index) groups via the Behring Islands, especially via St. Lawrence. This, of course, does not involve that also more southern ways of migration may have been followed by either of them, as appears from the curves of the Polynesians measured by NEUHAUSS [1]), TEN KATE [2]), REINECKE [3]) (continuous) and SHAPIRO (dotted line), and from SULLIVAN's work [4]).



To begin with the Central-Asiatic type among the American Indians, I registered in the continuous curve of fig. 11 the cephalic indices of the San Blas Indians measured by HARRIS [5]). In this curve the 83 and 86 index peaks are striking. In the same figure 71 Aleutian skulls are arranged (15 measured by DALL, and recorded by BESSELS [6]), 53 by HRDLICKA [7]) and

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[1]) R. NEUHAUSS. Anthropologische Untersuchungen in Oceanien, namentlich in Hawai. Zeitschr. f. Ethnol., Bnd. **17**, 1885, Verh. der Berl. Ges. f. Anthr. etc., p. 27.

[2]) H. TEN KATE. Contribution à l'anthropologie de quelques peuples d'Océanie. l'Anthropologie, Tome **4**, 1893, p. 279.

[3]) F. REINECKE. Anthropologische Aufnahmen und Untersuchungen auf Samoa. Zeitschr. f. Ethnologie, Bnd. **48**, 1896, p. 101.

[4]) SHAPIRO. The physical characters of the Society islanders. Mem. of the B. P. Bishop Museum, Vol. XI, 1930. SULLIVAN, Ibidem, Vol. IX, 1923.

[5]) R. G. V. HARRIS. The San Blas Indians. Journ. of Phys. Anthrop. Vol. **9**, 1926.

[6]) See BESSELS: Einige Worte über die Inuit (Eskimo) des Smithsundes nebst Bemerkungen über Inuitschädel. Arch. f. Anthrop. Bnd. **8**, 1875, p. 107.

[7]) HRDLICKA. The Eskimo, Alaska and related Indians, North Eastern Asiatics. Catalogue of human crania in the U. S. National Museum Collection, Vol. **63**, 1924.

3 by MONTANDON [1]). The correspondence of the 82 and 85 cranial index peaks with the cephalic 83 and 86 peaks of the San Blas Indians is equally striking as the correspondence of the BUNAKS' Armenian skull indices with my Armenian cephalic indices in fig. 12, the difference between the skull and living-head indices being in both cases one point.

In Table II N°. 13 the cranial indices of the Salish, Sahaptin and Caddoan skulls registered by HRDLICKA [2]) are arranged together with the Buriate skulls recorded by HRDLICKA [3]), FRIDOLIN [4]) and REICHER [5]), and some Korean skulls measured by BOGDANOW, TARENETZKY, KOGANEI and WALDEYER.

Although the number of the former is considerably smaller than the number of the latter, there is a striking correspondence between these groups in the Paleo-Asiatic 78 and 80 cranial (= 79 and 81 cephalic) index peaks, as well as in the Central-Asiatic 82 and 84 cranial (= 83 and 85 cephalic) index peaks.

The hyper-brachycephalic indices, however, are relatively more numerous among the Asiatic Buriate than among the American Salish, Sahaptin and Caddoan skulls.

The cephalic indices of the Comanches recorded by GOLDSTEIN [6]) (fig. 14) show a combination of one Paleo-Asiatic (81) and two Central-Asiatic peaks (83, 86). In this curve we also find an ultra-brachycephalic mutation peak at 89, which is not strange, considering the fact that the hyper-brachycephalic indices (85 and 86 indices together) are twice as numerous as the 83 peak.

The same phenomenon is observed in BOAS' curve of Osago Indians [7]) (fig. 15). The cephalic 86 peak being more than twice as large as the cephalic 83 peak, the occurrence of a great many ultra-brachycephalics cannot astonish us [8]).

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[1]) MONTANDON. Craniologie Paléo-Sibérienne. l'Anthropologie, Tome **36**, 1926, p. 209 and 447. One of M's skulls (not inserted in my curve) had an index of 71,87. MONTANDON himself does not consider this an Aleutian skull. In the interesting paper by W. JOCHELSON, Archeological investigations in the Aleutian Islands, N°. 367 of the Publications of the Carnegie Institution, Washington 1925, no individual indices are mentioned.

[2]) HRDLICKA. Catalogue of human crania in the U. S. National Museum Collections, Vol. **69**, 1927. The Algonkin and related Iroquois, Siouan, Caddoan, Salish and Sahaptin, Shoshonean and Californian Indians.

[3]) HRDLICKA. The Eskimo, Alaska and related Indians, North Eastern Asiatics. Catalogue of human crania in the U.S. National Museum Collection, Vol. **63**, 1924.

[4]) FRIDOLIN. Burjäten und Kalmücken Schädel. Arch. f. Anthrop. Bnd. **27**, 1902, p. 303.

[5]) REICHER. Untersuchungen über die Schädelform der alpenländischen und mongolischen Brachycephalen. Arch. f. Morph. und Anthrop. Bnd. **15** und **16**, 1913.

[6]) GOLDSTEIN. Anthropometry of the Comanches. Journ. of Physical Anthropology. Vol. **19**, 1934.

[7]) F. BOAS. Zur Anthropologie der Nord-Amerikanischen Indianer. Zeitschr. f. Ethnologie, Bnd. **27**, 1895 (Verh. der Berl. Gesellsch. f. Anthrop. etc. Jahrg. 1895, p. 366).

[8]) With the Apaches registered by BOAS, with whom an 83 peak even fails, the 87 peak being very high, the number of ultrabrachycephalics is still larger.

I shall not reproduce here all the Indian index curves made by BOAS or by myself from the data recorded by others, showing shapes that correspond more or less with Eastern Asiatic groups, but only add a few more figures in which this correspondence is specially striking. So the thick continuous line in fig. 16 is a reproduction of the cephalic index curve of the Mandan and Gross Ventre Indians, measured by BOAS. In the dotted curve I registered the Asiatic Eskimo indices recorded by Mrs. JOCHELSON-BRODSKY [1]). Evidently these curves show a great parallelism and in both of them the Paleo-Asiatic 79 and 81 indices give outstanding peaks.

That also only one of the Paleo-Asiatic peaks may occur with N. American Indians appears from fig. 17, where BOAS' Crow Indian indices are compared with the male and female Yakughir indices recorded by Mrs. JOCHELSON-BRODSKY, both having an 81 peak only. On the other hand BOAS' male Sioux show a 78, SALLER's [2]) a 79 cephalic peak only (cf. fig. 20).

That similar indicial relations are found in South America is shown by fig. 18, in which I compared RANKE's [3]) results concerning Brazilian Nahuqua, Auetö and Trumai tribes with JOCHELSON-BRODSKY's Chukchee.

In both curves the Paleo-Asiatic 79—81 peaks and the Central-Asiatic 83 peak occur, but the latter is more outstanding in the Asiatic Chukchee who in addition have also an outstanding 86 peak, failing in the Brazilian Indian curve. Among the female Quichas from Peru (fig. 19), measured by FERRIS [4]), only the Paleo-Asiatic 79 and 81—82 peaks occur [5]). Although with the Araucanas of S. America and the socalled Patagonians of the Chubut (in contrary to the Patagonians of the Rio Negro) Central-Asiatic peaks occur again, it seems that on the whole with the Indians of North and South America the meso-subbrachycephalic (Paleo-Asiatic) combination of indices is more frequent than the brachy-hyperbrachycephalic or Central-Asiatic type. As, however, the same already occurs in Eastern Asia, we cannot say that this is due to factors analogous to those influencing the descendants of the more recent American immigrants discussed before. At best we might say that these factors may favour the predominance of the Paleo-Asiatic index in America.

Naturally I do not intend to assume that all the precolumbian inhabitants of North and South America are derived from Eastern-Asiatic ancestors. Among the oldest Peruvian skulls (MacCurdy) as well as among the Fuegian and Patagonian skulls of the Rio Negro other features are found, but with those peoples and their index curves I shall deal later.

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1) JOCHELSON-BRODSKY. Zur Topographie des weiblichen Körpers Nord-Ost Sibirischer Völker. Arch. f. Anthrop. Bnd. **33**, 1906, p. 1.

2) SALLER. Zeitschr. f. Morph. und Anthrop. Bnd. **27**, 1930. According to HRDLICKA (Am. J. of phys. Anthr. Vol. XVI) the average of the males is 78.9, of the females 81.

3) K. E. RANKE. Anthropologische Beobachtungen aus Zentral-Brasilien Abh. Math. Phys. Klasse Kon. Bayr. Akad. der Wiss. Bnd. **24**, 1907.

4) FERRIS. Anthropological studies on the Quicha and Machiganga Indian, Transact, Conn. Acad. of Arts and Sciences. Vol. **25**, 1921.

5) With the male Quichas measured by this author the peaks are at 78 and 81.

Eskimoes.

I only want to add a few words concerning the Eskimoes.

It is well known that the Greenland Eskimo is different from the Alaska Eskimo. The latter, though not exactly the same as the Asiatic Eskimoes, has a Paleo-Asiatic cephalic index curve, as appears from fig. 20, in which the cephalic index curves of Alaska Eskimoes and Sioux are compared with the curve of an Asiatic group. In all of them the 78 peak is by far the most outstanding. Probably the same cephalic index is most prevailing with the male Eskimoes of St. Lawrence Island in Behring Street, since the male skulls from this island (continuous line fig. 21) recorded by HRDLICKA (l.c. 1924) have their peak at 77 (= the cephalic 78—79 peak).

For a comparison with Asiatic skulls I inserted in the same figure the curve of the Aino skulls already published in my preceding paper. The centre of the peak of both groups is at 77. Ethnological facts are also in favour of a relationship between the Alaska and St. Lawrence Eskimoes and the Asiatic Ainos.

This much is sure that the N.W. American Eskimo is closely related to Paleo-Asiatic groups.

On the other hand it is well known that the Greenland and Smithsound Eskimoes are very different. In fig. 22 I give the cranial index curves of the male and female adult Greenland Eskimo crania, examined by FÜRST and HANSEN [1]). The most outstanding peaks are the 70(71) and 73 ones.

In fig. 24 the male and female Greenland indices together are arranged in the continuous curve. In the same figure I inserted the male and female Huron and Algonkin skulls of the Atlantic coast of America, found in New England, especially in Maine, Massachussets, New Hampshire, Rhode Island, Connecticut, the most northern corner of New-York State, Long Island, Staten Island, and Manhattan, recorded by HRDLICKA (l.c. 1927). Their curve shows exactly the same peaks as the Greenland Eskimoes do. This confirms the assumption (chiefly made on the ground of cultural remains) that these N.W. Atlantic-coast Indians are related to the Greenland Eskimoes.

Similar indices as with the Greenland Eskimoes are found with the male Smithsound-Eskimo skulls measured by BESSELS [2]) (fig. 25), with the only difference that the Smithsound skulls have a tendency to a lowering of the index, as appears not only from the 70 and 72 peaks in BESSELS' curve instead of the 71 and 73 peaks in FÜRST and HANSEN's, but especially from the occurrence of a hyper-dolichocephalic peak at 67—68 in the curve of BESSELS' skulls. This mutation is not seldom observed with such groups

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[1]) FÜRST and HANSEN. Crania Groenlandica, Höst, Copenhagen, 1915.

[2]) BESSELS. Einige Worte über die Inuit (Eskimo) des Smithsundes, nebst Bemerkungen über Inuitschädel. Arch. f. Anthr. Bnd. 8, 1875, p. 107.

of dolichocephalic races as, living under poorer circumstances, acquire a more asthenic leptosome habitus [1]).

How can we explain the (70)71 and (72)73 peaks of the Greenland and Smithsound Eskimoes and the Atlantic-coast Hurons and Algonkins, these peaks being evidently *non-Eastern-Asiatic*.

The Greenland Eskimoes and also the Algonkins most likely are an ancient import, not from Eastern Asia but from Europe. WISSLER's opinion that they descend from very ancient European races, confirmed by several authors, is also confirmed by curve comparison.

So THURNAM's English Long Barrow skulls [2]), whose indices are shown by the dotted line in fig. 25, show a striking parallelism with BESSELS' Smithsound skulls. On the continent of Europe pronounced 71 and 73—4 peaks occur with the eneolithic population of North-East and Middle Germany, whose indices (dotted line) are shown in fig. 26 together with the indices of BOAS' New-England skulls [3]).

Most probably these ancient European races are closely related to the upper-paleolithic population of Europe, whose cranial indices — recorded by MORANT [4]) — are indicated in fig. 23. The fact that also with these skulls the 71 and 73 indices are the most frequent pleads in favour of a relationship of the Greenland Eskimoes and allied American Indians with the upper paleolithic race, a group of which may have retreated north with the retreat of the glaciers and the reindeer.

MORANT himself emphasized that the average upper paleolithic skull does not differ more from the average Eskimo skull than any Eskimo skull does. The curve in fig. 23 confirms TESTUT's [5]) and SOLLAS' [6]) opinion, accepted also by VON EICKSTEDT [7]) and WEINERT [8]), that the Greenland Eskimo is an upper paleolithic derivative. They probably are descendants of that

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[1]) For other examples of this see: An introduction to the Anthropology of the Near East, p. 173. The same is observed with the Chuhra Indo-Aryans, a Paria cast, in contrast with their Aral-Caspian ancestors.

[2]) PARSONS. On the Long Barrow Race and its relationship to the modern inhabitants of London. Journ. of the Anthropological Institute. Vol. **51**, 1921. This author also mentions several points of resemblance between the Long Barrow and Greenland Eskimo skull.

[3]) It is interesting to note that BOAS' New-England skulls have a distinct Paleo-Asiatic admixture (78 peak) and a small Central-Asiatic one (82 and 85 peaks), failing with the Greenland Eskimo and Long Barrow skulls.

[4]) MORANT. Studies of paleolithic man I: The Chancelade skull and its relation to the modern Eskimo skull. Annals of Eugenics Vol. I, 1926: IV. A biometrical study of the upper paleolithic skulls of Europe and of their relationships to earlier and later types. Ibidem Vol. V, 1930.

[5]) TESTUT. Recherches anthropologiques sur la squelette quarternaire de Chancelade. Bull. Soc. d'Anthrop. de Lyon, Tome **8**, 1890.

[6]) SOLLAS. The Chancelade skull. Journ. Anthrop. Institute. Vol. **52**, 1927.

[7]) VON EICKSTEDT. Rassenkunde und Rassengeschichte der Menschheit, Enke, Stuttgart, 1934.

[8]) WEINERT. Die Rassen der Menschheit, Teubner, Leipzig, 1935, p. 92.

upper paleolithic stock from which also the Proto-Aryans of the Eurasian steppes with their outstanding 71 peak and the African Hamites with their constant cranial 71—73 (cephalic 73—75) peaks [1]) may be derived.

The Aurignacian Combe-Capelle and the Magdalenian Chancelade skull — and perhaps the Solutrean Le Roc (MARTIN [2])) and Obercassel skulls — probably offer the nearest comparison for the Eskimo.

In the many millenia lapsed since the upper paleolithic period the above-mentioned branches of this ancient stock have naturally changed. Also the Greenland branch — though living partly still under the same conditions — has not remained the same. LE GROS CLARK [3]), although confirming the striking similarity between the Chancelade and the Greenland skull as far as concerns their general contour, scaphocephaly, parallel position of the lateral walls, anterior dolichocephaly, length and straightness of the bizygomatic arch, pointed to the differences between the orbital, palatal, humero-radial and humero-femoral indices (c.f. also KEITH [4])).

Yet, MORANT's researches as well as the frequency curves in fig. 23 and 24 clearly indicate the relationship between the upper paleolithic people and the Eastern Eskimo, whose utensils even still resemble Magdalenian implements (BOAS [5]), SOLLAS [6])). For the occurrence of other ancient transatlantic affinities, see also SCHARFF [7]).

As far as concerns the relationship of these Eskimoes with the Proto-Aryans of Eurasia, I may add that according to UHLENBECK [8]) the Eskimo languages, contrary to the American-Indian languages, have distinct Indo-European constituents, which he, however, explains by ancient contact and language-mixture on Siberian soil.

EXPLANATION OF TABLES.

Table I.

Fig. 1. Cephalic indices of male Southern Arabs from Jemen, Oman and Hadramaut after the data of LEYS and JOYCE, MOCHI, BERTRAM THOMAS, KROGMAN and KEITH, and CIPRIANI.

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[1]) See my next paper. The similarity of some ancient Atlantic coast skulls from Rhode Island with African skulls apparently is so great in many respect that a painstaking worker as R. B. DIXON took them for oriental (Negroid) skulls.

[2]) MARTIN. l'Atelier solutréen du Roc. l'Anthropologie, Tome **38**, 28.

[3]) LE GROS CLARK. On a series of ancient Eskimo skulls from Greenland. Journ. of the Anthr. Inst. Vol. **50**, 1920. See also Man Vol. **26**, 1926.

[4]) KEITH. Was the Chancelade man akin to the Eskimo? Man, Dec. 1925.

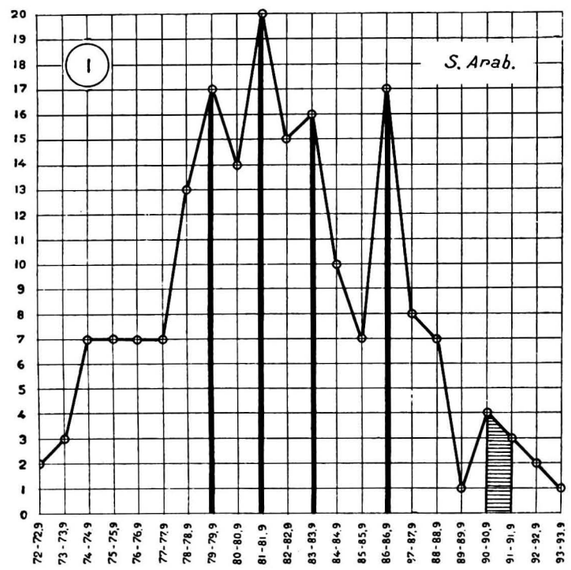
[5]) BOAS. The Eskimoes of Baffin's Land and Hudson Bay. Bull. of the American Museum of Natural History, Vol. **15**, 1901.

[6]) SOLLAS. Ancient Hunters, fig. 177.

[7]) SCHARFF. On the evidence of a former landbridge between Northern Europe and North America. Proc. Roy. Irish Academy, Vol. **28**, 1909—'10.

[8]) UHLENBECK. Oer-Indogermaansch en Oer-Indogermanen. Mededeelingen der Kon. Akad. van Wetenschappen, Amsterdam. Afdeel. Letterkunde, Deel **77**, Serie A. N°. **4**, Amsterdam 1935.

Table I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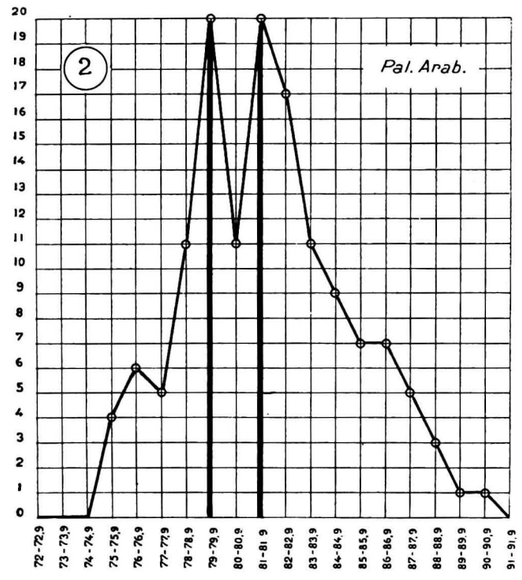
S. Arab.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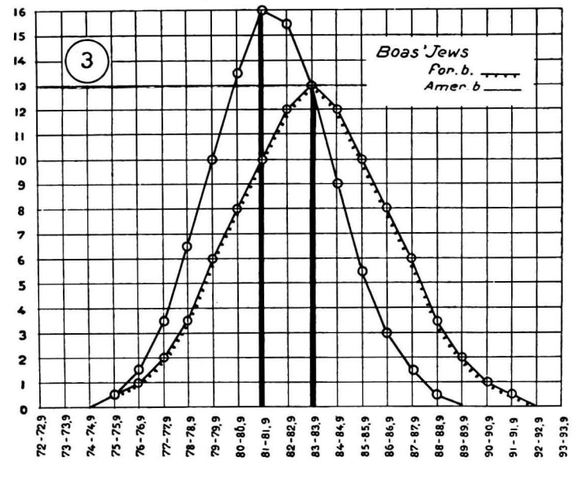
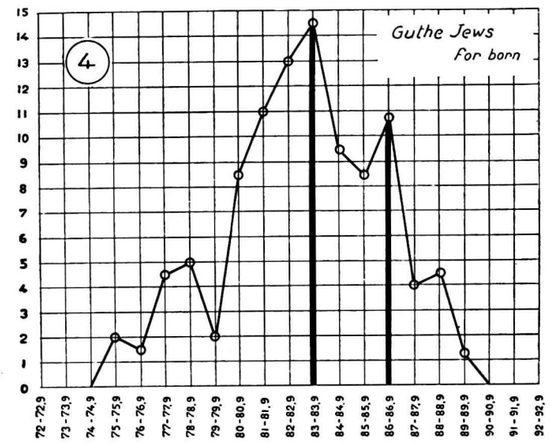
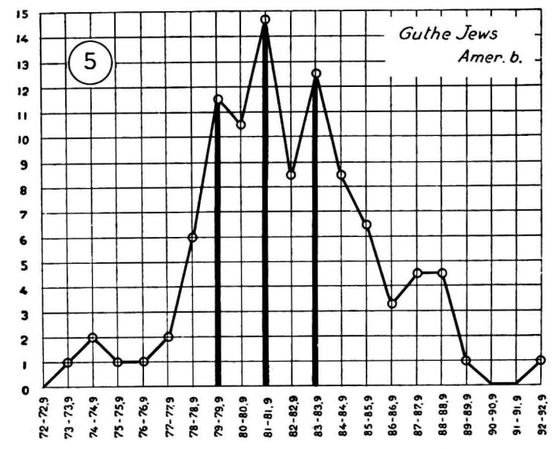
Pal. Arab.


3
Boas' Jews
For. b.
Amer b


4
Guthe Jews
For born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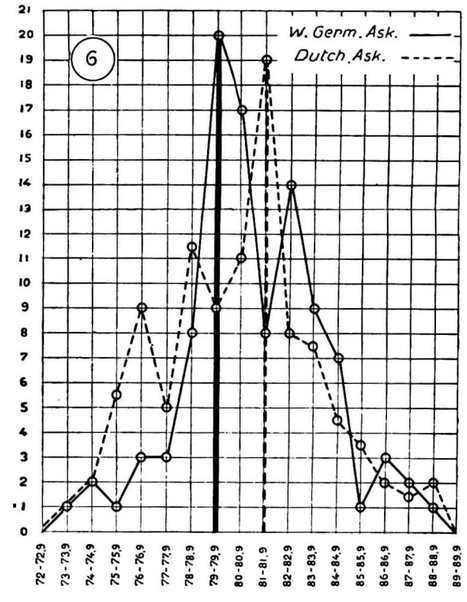
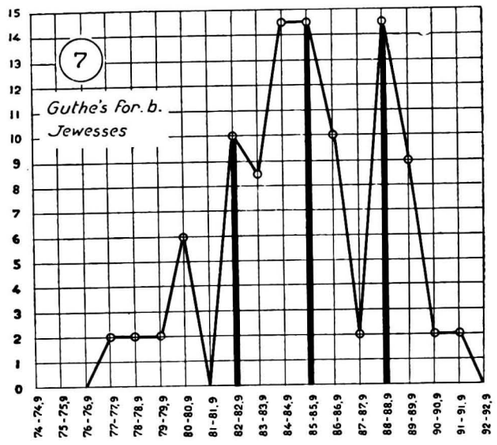
Guthe Jews
Amer. b.


6
W. Germ. Ask.
Dutch Ask.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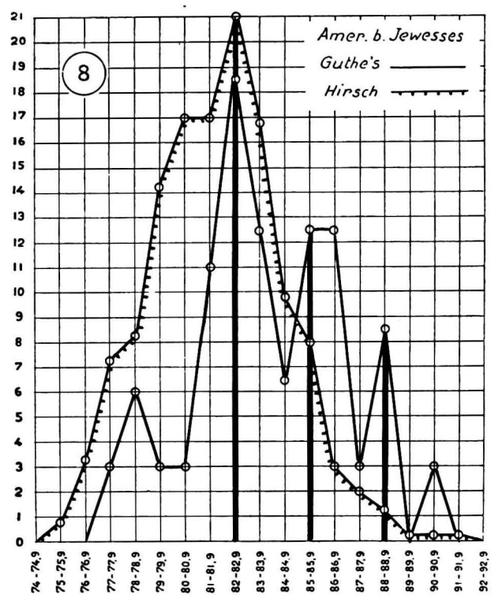
Guthe's For. b.
Jewesses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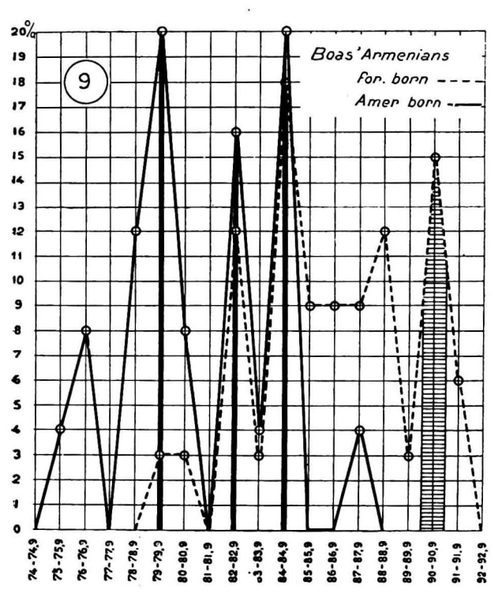
Amer. b. Jewesses
Guthe's
Hirsch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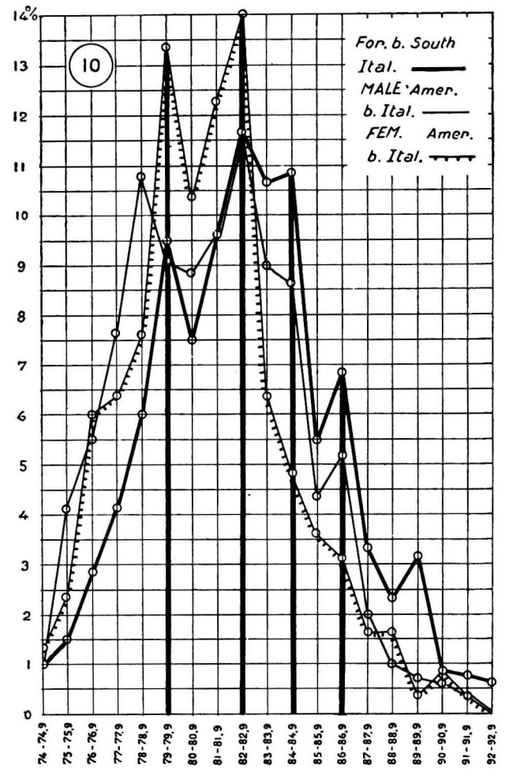
Boas' Armenians
For. born
Amer born


10
For. b. South
Ital.
MALE Amer.
b. Ital.
FEM. Amer.
b. Ital.

11
cran. indic.
Aleut.
ceph. ind.
S. Blas Ind.

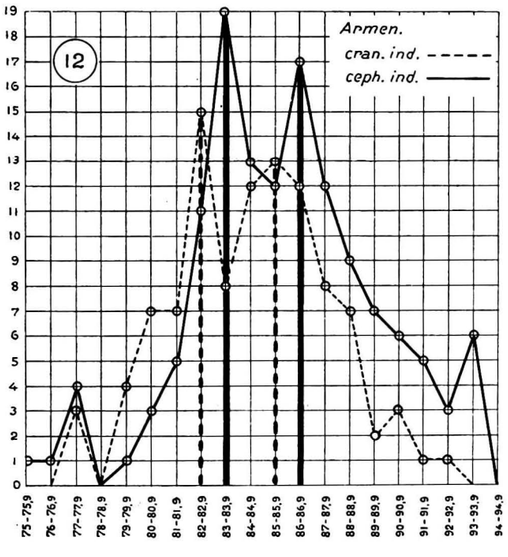
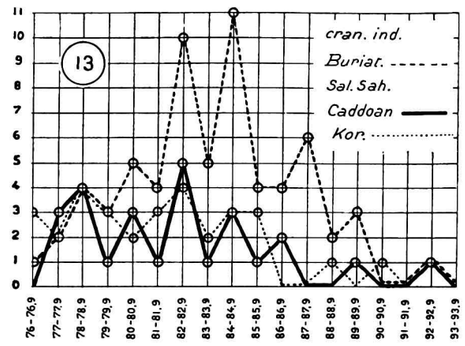

12
Armen.
cran. ind.
ceph. ind.

Table II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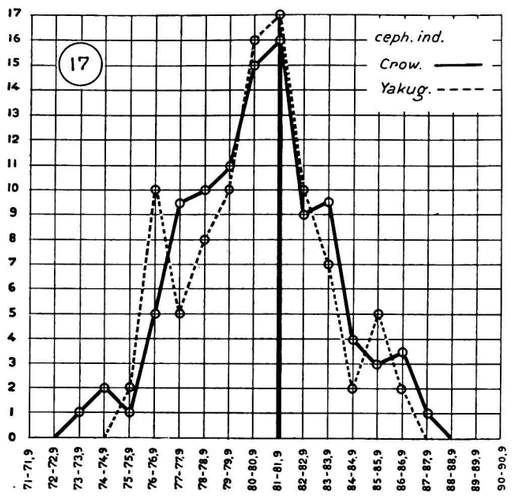
cran. ind.
Buriat.
Sal. Sah.
Caddoan
Kor.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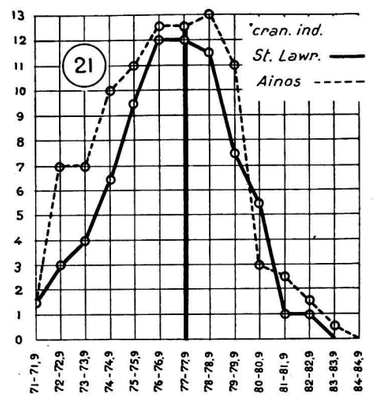
ceph. ind.
Crow.
Yakug.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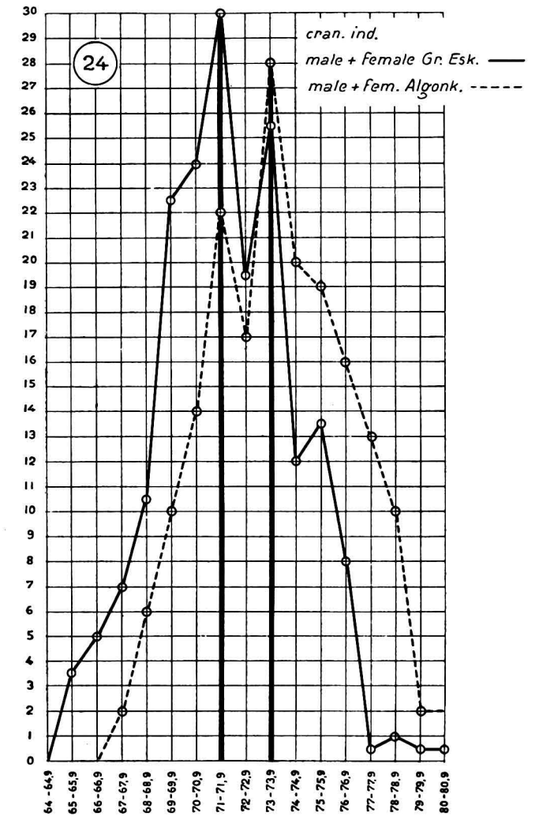
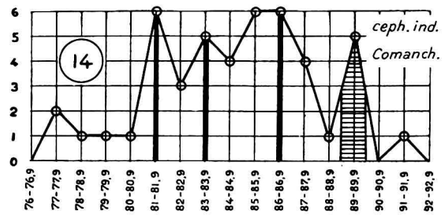
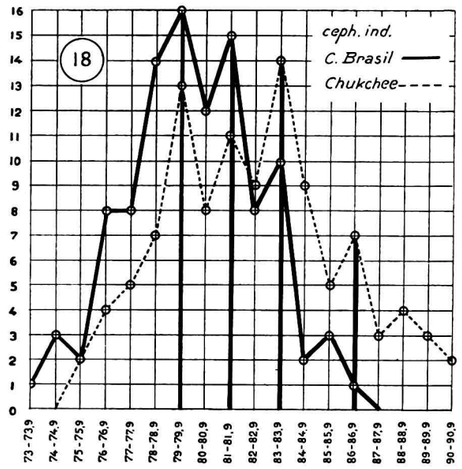
cran. ind.
St. Lawr.
Ainos


24
cran. ind.
male + Female Gr. Esk.
male + Fem. Algonk.


14
ceph. ind.
Comanch.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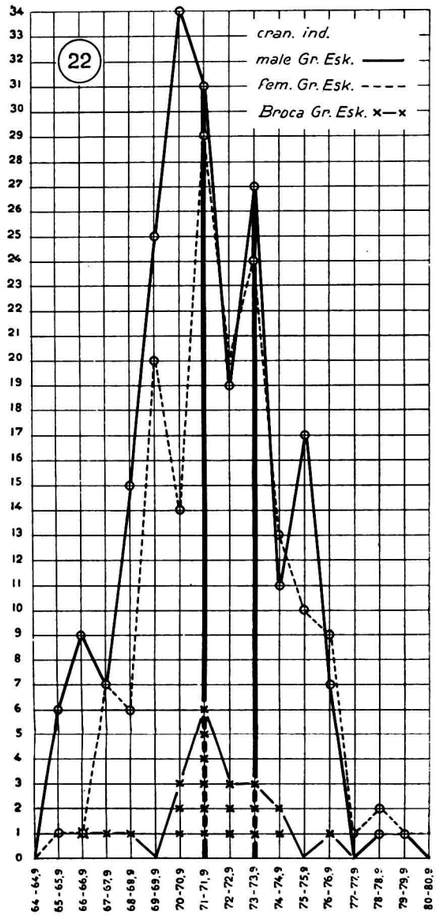
ceph. ind.
C. Brasil
Chukchee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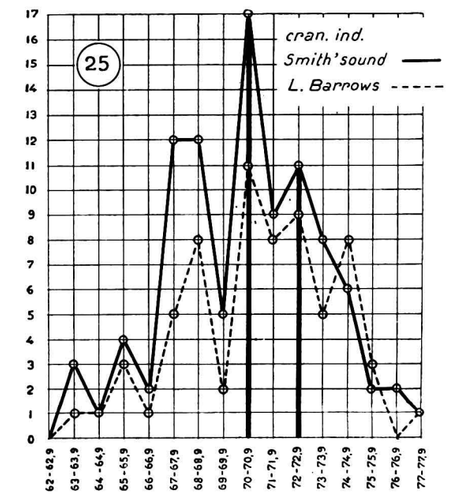
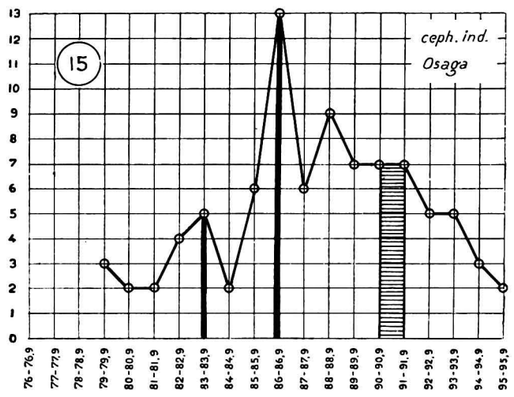
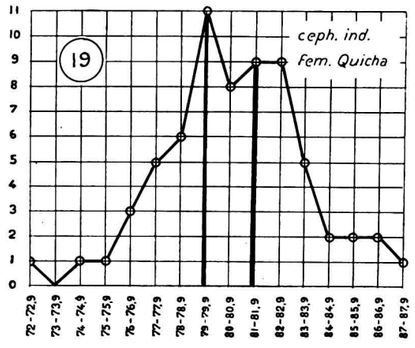
cran. ind.
male Gr. Esk.
fem. Gr. Esk.
Broca Gr. Esk.


25
cran. ind.
Smith'sound
L. Barrows


15
ceph. ind.
Osaga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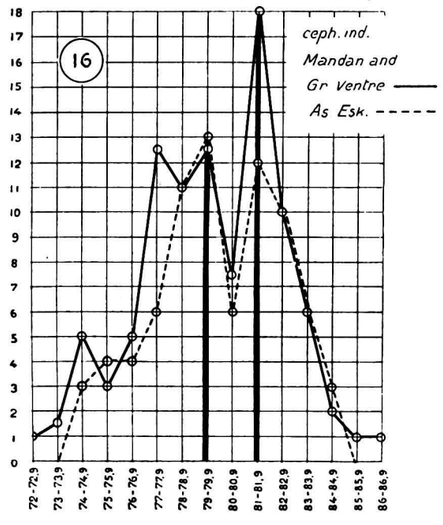
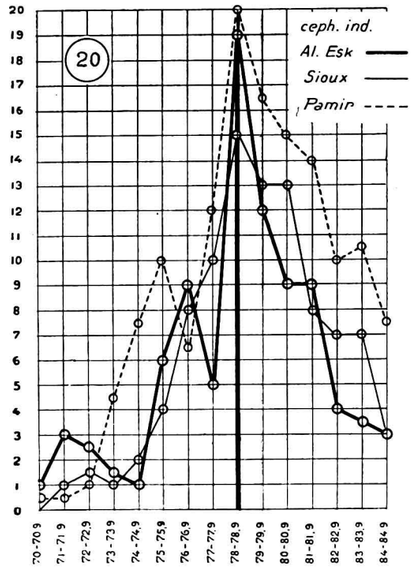
ceph. ind.
Fem. Quicha


16
ceph. ind.
Mandan and
Gr Ventre
As Esk.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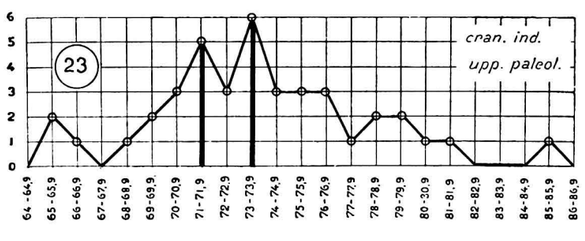
ceph. ind.
Al. Esk
Sioux
Pamir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cran. ind.
upp. paleol.

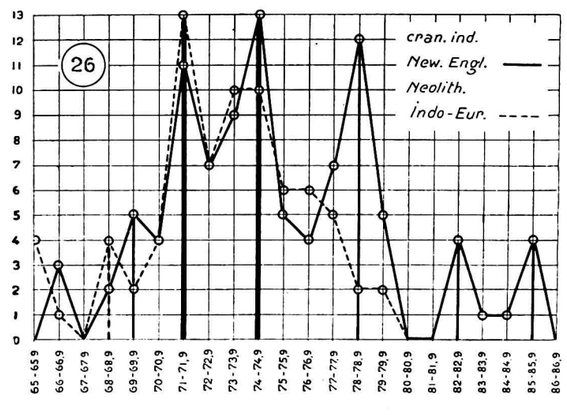
26
cran. ind.
New. Engl.
Neolith.
Indo-Eur.

Fig. 2. Cephalic indices of male Palestinian Arabs by KAPPERS.
Fig. 3. Cephalic indices of male Jews by BOAS (for b. = foreign born; Amer. b. = their American born sons).
Fig. 4. Cephalic indices of foreign born male Jews after GUTHE.
Fig. 5. Cephalic indices of their American born sons by GUTHE.
Fig. 6. Full line: Cephalic indices of male Askenasim Jews from Cologne and Francfort a/M by WEISSENBERG. Dotted line: Idem of male Askenasim Jews measured at Amsterdam by KLEIN and KAPPERS.
Fig. 7. Cephalic indices of foreign born female Jews by GUTHE.
Fig. 8. Full line: Cephalic indices of their American born daughters by GUTHE; Coambed curve cephalic indices of American born female Jews, after the data of HIRSCH.
Fig. 9. Cephalic indices of BOAS' foreign and American born Armenians males and females, expressed in percentages (see text).
Fig. 10. Thick line: cephalic indices of male foreign born Neapolitans, measured by LIVI. Thin line: idem of American born male Neapolitans, measured by HIRSCH. Coambed line: idem of American born female Neapolitans measured by the same.
Fig. 11. Continuous curve cephalic indices of male San Blas Indians, measured by HARRIS. Dotted curve: cranial indices of Aleutian skulls, registered by HRDLICKA.
Fig. 12. Continuous curve: cephalic indices of Armenians measured by KAPPERS. Dotted curve: cranial indices of Armenians measured by BUNAK.

Table II.

Fig. 13. Continuous curve: cranial indices of Salish, Sahaptim and Caddoan Indian skulls, measured by HRDLICKA. Broken curve: idem of Buriate skulls measured by the same. Dotted curve: idem of Korean skulls measured by KOGANEI TARENETSKY, BOGDANOFF and WALDEYER.
Fig. 14. Cephalic indices of male Comanches, measured by GOLDSTEIN (some by BOAS).
Fig. 15. Cephalic indices of male Osaga Indians, measured by BOAS.
Fig. 16. Continuous curve: cephalic indices of male Mandan and Gross Ventre Indians, by BOAS. Dotted curve: dito of female Asiatic Eskimoes, measured by Mrs JOCHELSOHN-BRODSKY.
Fig. 17. Continuous curve: cephalic indices of male Crow Indians, measured by BOAS. Dotted curve: dito of male (and female) Yakughirs, recorded by JOCHELSOHN-BRODSKY.
Fig. 18. Continuous curve: cephalic indices of male Nahuqua, Auetö and Trumai Indians of Central Brasil, measured by RANKE. Dotted curve: dito of male Chukchee, recorded by JOCHELSOHN-BRODSKY.
Fig. 19. Cephalic indices of female Quicha Indians measured by FERRIS.
Fig. 20. Thick continuous curve: cephalic indices of male Alaska Eskimoes measured by BOAS (1 = 2). Thin continuous curve: idem of 580 male Sioux by the same (1 = 2). Dotted curve: idem Pamirese recorded by Sir AUREL STEIN and recorded by JOYCE (1 = 2).
Fig. 21. Continuous curve: cranial indices of St. Lawrence Eskimoes, measured by HRDLICKA. Dotted curve: idem of Aino's recorded by KOGANEI, KOPERNICKI and others (1 = 2).
Fig. 22. Continuous curve: cranial indices of male Greenland Eskimo skulls, measured by FÜRST and HANSEN. Dotted curve: idem of female skulls, measured by the same; Crosses: Greenland skulls of BROCA.
Fig. 23. Cranial indices of upper paleolithic skulls, recorded by MORANT.
Fig. 24. Continuous curve indices of all the male and female Greenland Eskimo skulls measured by FÜRST and HANSEN. Dotted curve: the male and female Algonkin skulls from Maine, Vermont, New Hampshire, Rhode-Island N.E. New-York State, Long-Island, Staten- and Manhattan Island, measured by HRDLICKA.

Fig. 25. Continuous curve: cranial indices of Smith Sound Eskimoes, recorded by BESSELS. Dotted curve: indices of the Long Barrow skulls, measured by THURNAM and PARSONS.

Fig. 26. Continuous curve: cranial indices of the New-England skulls, measured by BOAS. Dotted curve: cranial indices of the neolithic skulls from North-East and Middle-Germany, recorded by SCHLIZ.

Biochemistry. — *A few remarks on the iodine-amylum reaction.* By G. v. ITERSON JR. and J. COUMOU.

(Communicated at the meeting of June 29, 1935).

1. F. MYLIUS (16) contended in 1887 that besides the presence of iodine the presence of iodides or of hydriodic acid is required to form the blue iodo-amylum. Results apparently in contradiction with this should be explained, according to MYLIUS, by the formation of potassium iodide or hydriodic acid, the glass being of special influence in this matter.

This idea has been contested among others by L. BERCZELLER (4) in 1917, who stated that the iodine reaction may take place without the presence of iodine ions, for example, by using pure iodine in boiled quartz glass-ware.

In point of fact the iodine reaction succeeds, if executed according to the method of C. NÄGELI (17), with a slight variation, a crystal of pure iodine in water on a quartz slide being used. If, however, it is considered that grains of starch contain exchangeable ash constituents, then neither BERCZELLER's observation nor the experiment indicated by us proves convincing. BERCZELLER's statement is besides impaired since he assumes that the presence of iodine ions intensifies the colour of iodo-amylum, omitting to state, however, why this should be the case.

Furthermore, the arguments against MYLIUS put forward by N. VON EULER and K. MYRBÄCK (8) in 1922 are weak, thus making MYLIUS' conception still maintainable.

2. In the course of time a great number of compounds have become known which produce a blue coloration with iodopotassium iodide, similar to the one produced with starch. In particular G. BARGER (1, 2 and 3) and cooperators have enlarged our knowledge in this respect. Only recently D. KRÜGER (14) added a new example.

From these data it appears that the occurrence of the blue reaction is connected with either the presence or formation of crystals, or with the colloidal state of the reacting product. In the real solutions no blue iodine reaction has been observed up to now. Assuming that "crystallites" are present in the colloidal state, we can reduce the condition necessary for the occurrence of the reaction to the requirement that the matter must be in crystalline state.