Anthropology. — *The Central Asiatic barrier and the distribution and associated occurrence of cephalic index peaks in Asiatic-European races.* By C. U. ARIËNS KAPPERS.

(Communicated at the meeting of October 27, 1934).

In previous communications in these Proceedings (1931, '32 and '33), and in an "Introduction to the Anthropology of the Near-East in ancient and recent times" [1]) I called the attention to the comparison of frequency curves instead of averages for the establishment of homologous head indices of various peoples.

This method is the more advisable as no groups whatever are pure, and their different admixtures with other races [2]) may influence the averages to such an extent that they obscure homologous groups which may be revealed by curve comparison.

Encouraged by the result of this way of investigation I have applied the same method to more peoples of the Eurasian mainland confining myself north of the 30th parallel, for Europe North of the 44th, thus excluding the mediterranean region that has been partly dealt with in the above quoted book.

The result of this work is not only interesting on account of the relations it reveals, but also on account of the fact that it shows an interesting mutability in the index, the knowledge of which may be valuable as it may give us a clue to developmental features of the human skull.

Before dealing with the index curves I may remind that the Asiatic mainland is divided diagonally by the mountainous ranges of the Hindoo-Koosh, Pamir, Tien Shan, Altai Tag, and Sajan mountains in a Western and Eastern part, the importance of which for racial distributions has been emphasized by various authors, especially by VON EICKSTEDT [3]). The Himalayan and Trans-Himalayan barrier has a similar importance for the distribution in Southern and Northern direction, but the distribution South of the Himalayan barrier will not be considered in this paper. What concerns us here is the indicial distribution North of the Himalayan barrier.

In Table I I plotted some of the most important groups of indices, arranging the curves so that those to the right of the dividing line refer to

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[1]) N.V. Noord-Hollandsche Uitgevers Maatschappij, Amsterdam, 1934.

[2]) Eventually also different mutations of the head index; see p. 606.

[3]) VON EICKSTEDT, Rassenkunde und Rassengeschichte der Menschheit, Enke, Stuttgart 1933.

peoples East, those to the left to peoples West of the mountainous barrier mentioned above.

What strikes us first of all is the prevalence of the 79 and 81 (82) combination East of the barrier and the frequent occurrence of the 83 (84)—86 (87) combination to the West.

Several peaks in the curves show a striking constancy with the allowance of a variation of one entity in the peak. This slight difference may be due to differences in the personal ways of measuring, to the differences of instruments, but also to real variations falling within this range.

A typical example is seen with the Turks measured by VON LUSCHAN and those measured by myself (Table I, N°. 6), the highest peak in VON LUSCHAN's curve being at 86, in my curve at 87. Such a difference does not seem to have great importance for the problem that concerns us, as a comparison of the various curves suggests. It may be an expression of variability falling in the same category as the variability found by BOAS in his studies of the American born Jews and American born Italians in which cases the difference (expressed in averages by BOAS) also involved about one entity.

These *variations* should be well distinguished from the greater changes or *mutations* that will be discussed below.

First dealing with the Western side of the barrier I must call the attention to the curves on Table I, fig. N°. 1, showing in a thin continuous line the cephalic indices of 126 males of Khotan and Turfan, Taklamakan border cities in the Pamirs [1]), registered by Sir AUREL STEIN [2]), and published by JOYCE [3]). In the thick continuous curve to these indices are added those of the 37 ♂ Kirghises recorded by JOYCE, and of the 242 ♂ Kirghises of Ferghanah, Kohistan and Kouldja recorded by DE UJFALVY [4]). From the result it appears that these central Asiatic brachy- and hyper-brachycephals are closely related as far as their index is concerned [5]), the chief peaks being at 83 and 87.

Underneath these central Asiatics I put 176 male Armenians from New Julfa (near Isphahan) in Persia, measured by Dr. KRISCHNER [6]). Apparently the same peaks occur here. The additional 78 peak (failing with the Kirghises) is due to Persian admixture (cf Table II N° 12) as proved before [6]), and need not concern us at the moment.

Again the same index peaks are found with the population of the Alouite

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[1]) In addition to these a large number of 78 index people occurs in Chinese Turkestan. They are registered in table II, fig. 12, dotted line, together with the Kurds (continuous line) and Persians (crossed line) and will be later discussed.

[2]) Sir AUREL STEIN, Serindia, Vol. III, Oxford, 1924.

[3]) JOYCE, Notes on the physical anthropology of Chinese Turkestan and the Pamirs. Journ. of the Anthrop. Instit., Vol. **56**, 1926.

[4]) DE UJFALVY, Expédition scientifique française en Russie, en Sibérie et dans le Turkestan, Vol. I and II, Lerroux, Paris, 1878 and 1879.

[5]) The same may hold good for the 56 female Yakuts measured by Mrs. JOCHELSON BRODSKY, indicated by the dotted curve, and so different in their indicial relation from the male Yakuts, measured by HECKER (Table I, N°. 11 dotted line, resembling the Jakughir curve).

[6]) Dr. and Mrs. KRISCHNER, The anthropology of Mesopotamia and Persia. C. The anthropology of Persia. These Proceed., Vol. **35**, 1932.

mountains, the Ansarieh, living in Syria, North of the Lebanon, measured by myself (145), and by CHANTRE [1]) (48): Table I N°. 3.

A curious fact, however, is that facially the people registered in curve N°. 1 on one hand and curve N°. 2 and 3 on the other hand do not at all resemble each other, the former showing frequently (not always) mongoloid, the latter semitic or, better, armenoid features. This is a clear proof of the fact, also emphasized by TSCHEPOURKOWSKY (l.c. infra), MORANT [2]), KOHLBRUGGE [3]), and RIPLEY [4]), that facial characteristics, however important for establishing relations in a narrower sense, have not nearly the same value for the racial relations in a wider sense.

The people registered in textfigure 1: 181 male Lebanese measured by myself (continuous line) and the 280 male Druses (200 measured by SHANKLIN, 80 by myself; dotted line) show very homologous curves differing only in the subbrachycephalic admixture, this admixture with the Lebanese having a peak at 80, with the Druses at 82.

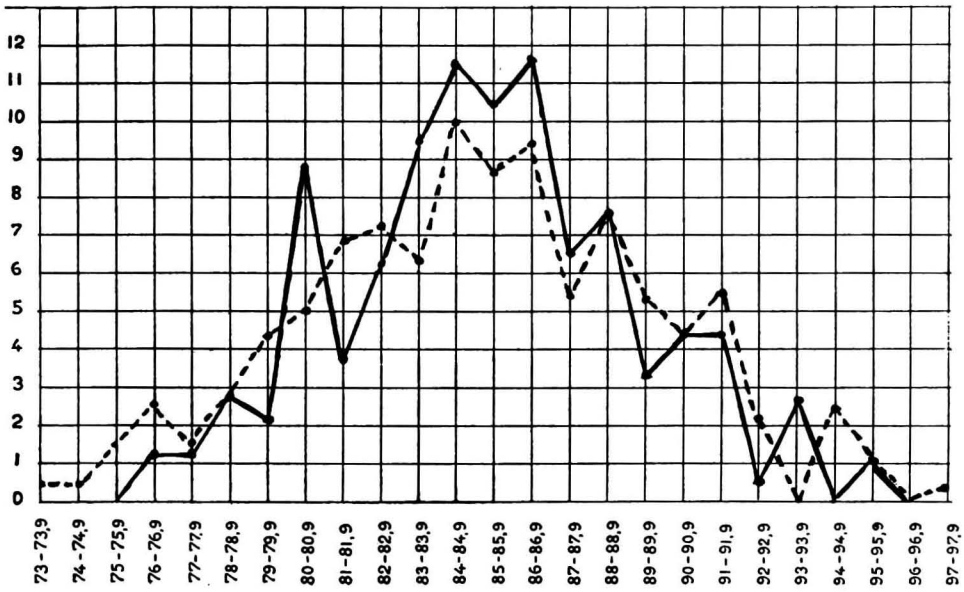


Fig. 1. Continuous line: 181 male Lebanese, measured by the author. Dotted line: 280 male Druses (200 measured by Dr. SHANKLIN, 80 by the author), expressed in percentages.

With these peoples, both chiefly living in the Lebanon mountains, the highest index peaks are not at 83 and 87 but at 84 and 86. As stated above, such differences fall in the usual range of variation, the same phenomenon being seen with the hyperbrachycephalic index of my Turks and those measured by VON LUSCHAN (Table I, N°. 6).

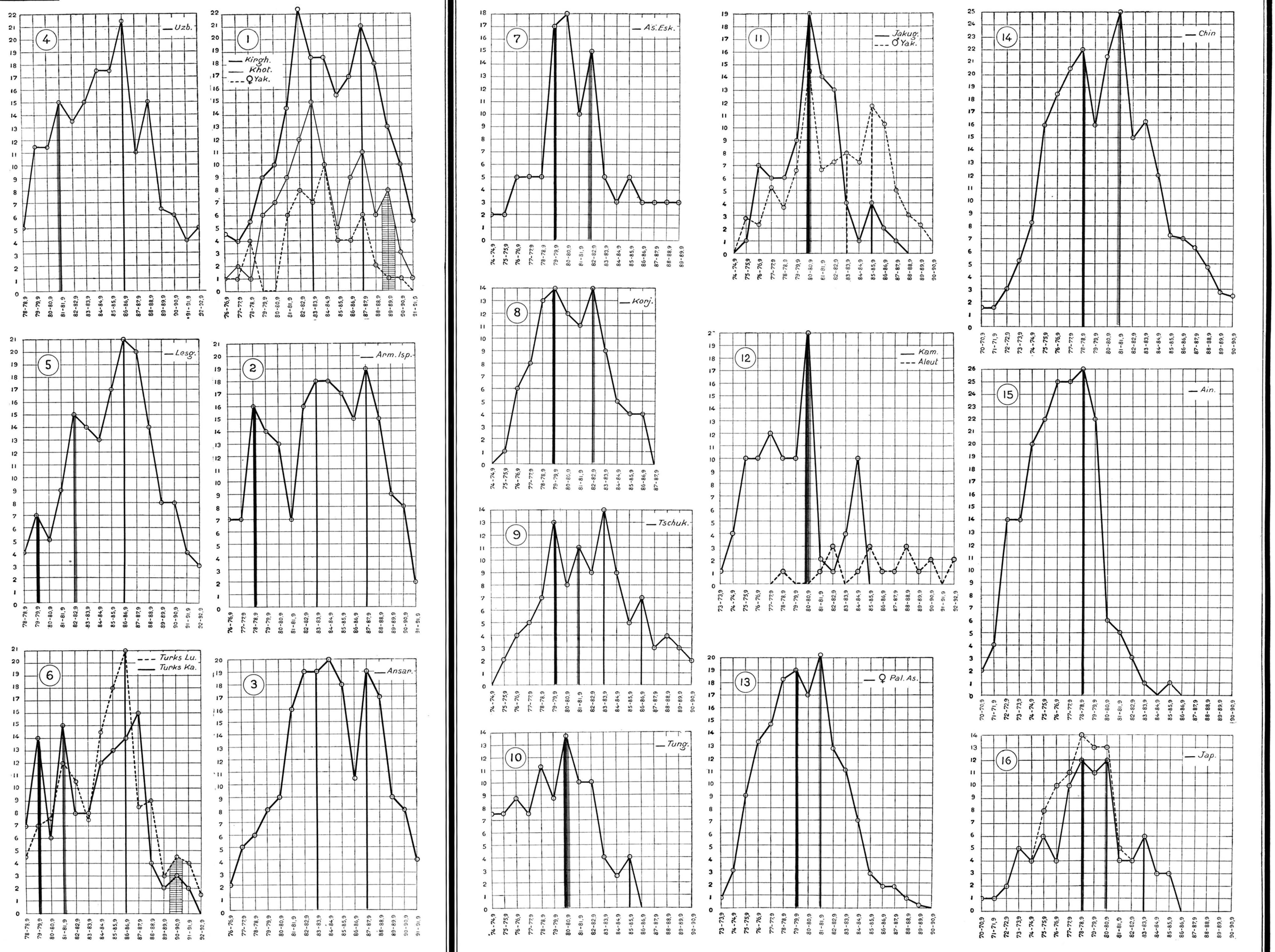
[1]) CHANTRE, Recherches anthropologiques dans l'Asie occidentale. Mémoires du Museum d'histoire Naturelle de Lyon T. 4, 1895.

[2]) MORANT, A preliminary classification of European races. Biometrika, Vol. 20 B. 1928.

[3]) KOHLBRUGGE, Systematisch en beschrijvend leerboek der Volkenkunde, 1930.

[4]) RIPLEY, Peoples of Europe, 1890, p. 363.

Table I


4 — Uzb.
1 — Kirgh. — Khot. --- ♀Yak.
7 — As. Esk.
11 — Jakug. --- ♂Yak.
14 — Chin
5 — Lesg.
2 — Arm. Isp.
8 — Korj.
12 — Kam. --- Aleut
15 — Ain.
9 — Tschuk.
6 — Turks Lu. — Turks Ka.
3 — Ansar.
10 — Tung.
13 — ♀ Pal. As.
16 — Jap.

With the Turks it is striking that their main peak (86) coincides with the main peak of VON ERCKERT's[1]) Lesghians (Table I, N°. 5) and OCHANINE's[2]) Uzbeks (N°. 4).

While, however, in these peoples the 83 (84) index, so often associated with the 86 (87) index, fails we find with the Turks and Lesghians an additional 79 and 81 (82) peak (with the Uzbeks an indication of an 82 peak).

These peaks, frequently associated, indicate an other racial influence, widely spread East as well as West to the Central Asiatic barrier but especially East, as appears from the index curves to the right of the black (barrier) line in Table I (Nos 7—16).

I shall return later to this category of associated indices, but before doing so shall deal with the Western spread of the Central Asiatic brachy- and hyperbrachycephalics, referring for this to Table II.

In the right top of Table II (N°. 1) I registered the male Jenessei Ostyaks recorded by ANUTCHINE[3]). Here again we have associated 83 and 85 peaks, occurring also among the Syrjans (Table II, N°. 2) and Ob-Samoyedes (83—87) measured by SOMMIER[4]) (N°. 3) and among DENIKER's Kalmucks[5]) (N°. 4: 83—87), in TSCHEPOURKOWSKY's Waldai type[6]) from Central and West Russia (N°. 6) and in the Germans from Pomerania between the Oder and Weichsel rivers, so thoroughly examined by REUTER[7]) (Table II, N°. 5).

In some of these people there are also indications of a (78) 79 or 81 peak or both. The 78 (79)- 81 (82) peaks, however, prevail in SOMMIER's Ob-Ostyaks (N°. 7), HELLA PÖCH's Volhynians (N°. 8; l.c. infra), in TSCHEPOURKOWSKY's Riasan type (Table II, N°. 10), and the Volga Tscheremisses recorded by SOMMIER[8]) (dotted curve in Table II, N°. 10).

Leaving the discussion of the latter peaks aside for the moment I first

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[1]) VON ERCKERT, Kopfmessungen Kaukasischer Völker. Arch. f. Anthropologie, Bnd. **18** and **19**, 1890 and 1891.

[2]) OCHANINE and JESCHEWICZ, Beiträge zur Anthropologie der Bevölkerung von Uzbekistan. Public. of the scientific department of the U.S.S.R. Commissariate Taschkend and Samarkand, 1929 (Russian).

[3]) ANUTCHINE, Anthropology of the Ostyaks (Russian) Moskow 1911. I am greatly indebted to Prof. V. STEFKO, Moskow for sending me a copy of this valuable paper. The Ob-Ostyaks registered by SOMMIER are very different, they apparently represent an other race. (cf. Table II N° 1 and N° 7).

[4]) SOMMIER, Arch. Antropologia e per l'Etnologia T. XVII.

[5]) DENIKER, Etude sur les Kalmouks, Revue d'anthrop. Serie II, T. VI et VII, 1883, 1884.

[6]) TSCHEPOURKOWSKY, Distribution géographique de la forme du crane etc. des paysans russes. Moskow, 1913. See also Arch. f. Anthrop., Bd. X, 1911.

[7]) F. REUTER, Beiträge zur Anthropologie Hinter-Pommerns. Arch. f. Anthropologie, Bnd. **28**, 1903.

[8]) SOMMIER, Note di viaggio. Esposizione Uralosiberiano di Ekateraburg. Ceremissi degli Urali e del Volga. Arch. per l'Antropologia e per l'Etnologia, Tomo **18**, 1888.

want to emphasize a feature occurring with the 83—83 groups, viz. the ultrabrachycephalic (89—90) index peak already indicated in Table I with the Kirghises (N°. 1) and Turks (N°. 6), and in Tables II, N°. 1 with the Jenessei Ostyaks and Ob-Samoyedes (N°. 3), but more evident in TSCHEPOURKOWSKY's Waldaitype (Table II, N°. 6), and with the Telengete Mongols of the Altai Tag (Table III, N°. 1) examined by REICHER [1]).

The curious fact with this ultrabrachycephalic peak is that it may and may not occur in groups of the same people, its appearance being apparently influenced by special conditions. So, while it fails with the 175 male Armenians I measured in Syria and Turkey (dotted line: Table III, N°. 2), it is very pronounced with the 200 female Armenians measured by Dr. KRISCHNER in Beirut (continuous line Table III, N°. 2). Yet its occurrence does not depend on sex, as appears from its presence among FRIZZI's [2]) Tirolese skulls, but not with TAPPEINER's [3]) Tirolese skulls (Table III, N°. 4), and from its occurrence among the male Kirghises and the male Turks.

Here we have to do with a greater change than merely the variation of one entity in the index peak, a change that points to a *mutationlike difference*.

It is important to note that this feature specially occurs with such groups of the 83 (84)—86 (87) index people in which the 86 (89) index prevails over the 83 (84) index.

So we find it with the Telengete skulls examined by REICHER (Table III, N°. 1), in KRISCHNER's female Armenians in which, contrary to my male Armenians (who do not show it) the 86 peak is higher than the 83 peak. Similarly with FRIZZI's Tirolese, in which it occurs, the 87 index group is higher than in TAPPEINER's Tirolese curve in which the ultrabrachycephalic peak fails (Table III, N°. 4). In the Waldai type (Table II, N°. 6), in which the 86 peak is higher than the 83 peak this ultrabrachycephalic peak again occurs. On the contrary it fails with RANKE's [4]) Bavarian skulls (Table III, N°. 5) in which the 83 (= 84 ceph. index) prevails over the 86 (=87 ceph. index), and with CWIRKO-GODYCKI's Bosnians (Table III, N°. 3) among whom the 86 peak is low.

The sole exceptions to this rule are DENIKER's Kalmucks (Table II, N°. 4), where the 86 peak is higher than the 83 one and yet an 89—90 peak fails, while in LIVI's Lombardians (Table III, N°. 6) and GRÜTZNER's girls from Zürich (Table III, N°. 9) where the 87 peak is low, an ultrabrachycephalic peak occurs.

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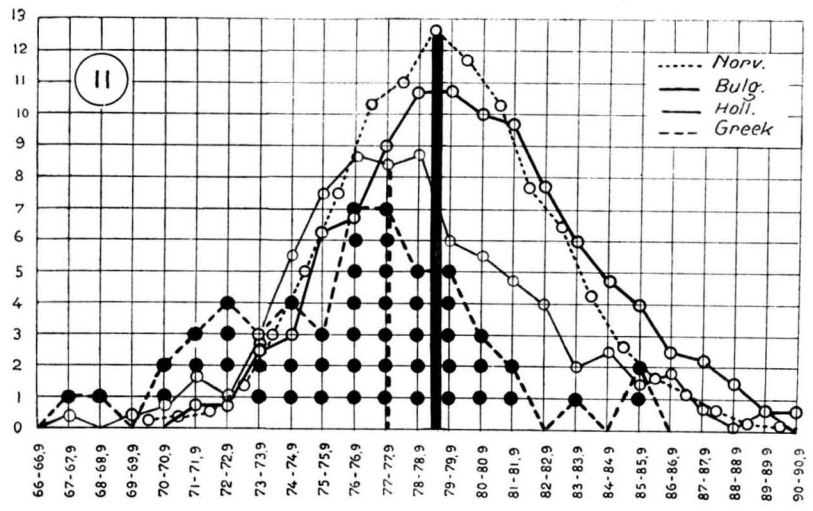
[1]) REICHER, Untersuchungen über die Schädelformen der Alpenländischen und Mongolischen Brachycephalen. Zeitschr. f. Morphol. u. Anthrop. Bnd. **15** and **16**, 1913.

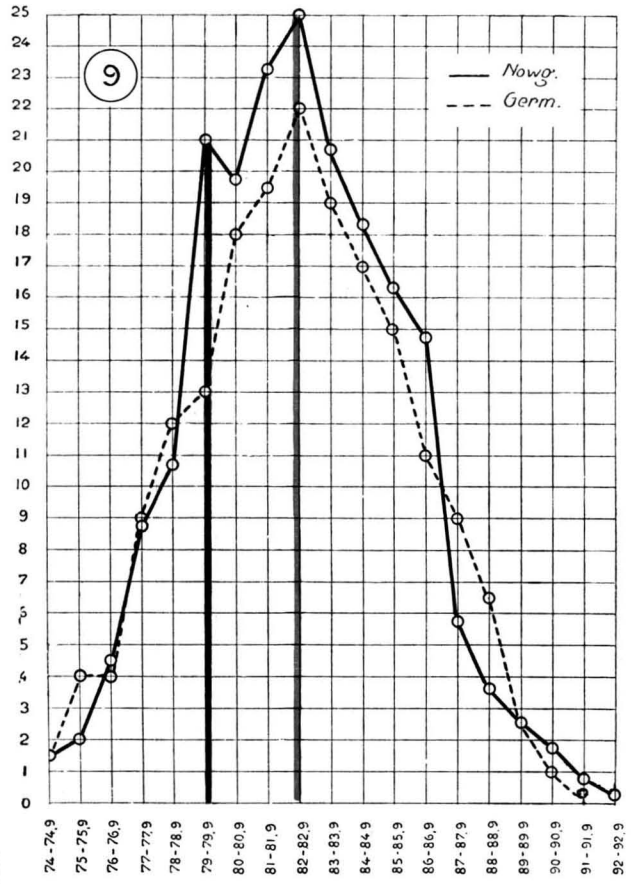
[2]) FRIZZI, Ein Beitrag zur Anthropologie des Homo Alpinus Tirolensis Mitt. der Anthrop. Gesellsch. in Wien. Bnd. **39** (N. F. Bnd. **9**) 1909.

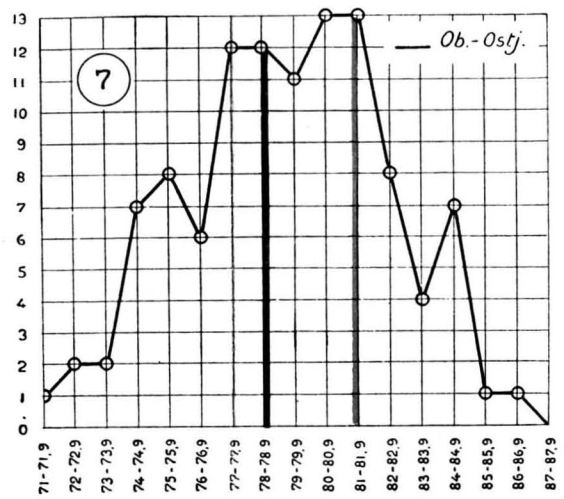
[3]) TAPPEINER, Beiträge zur Ethnologie und Anthropologie Tirols. Zeitschr. f. Ethnologie, Bnd. **12**, 1880.

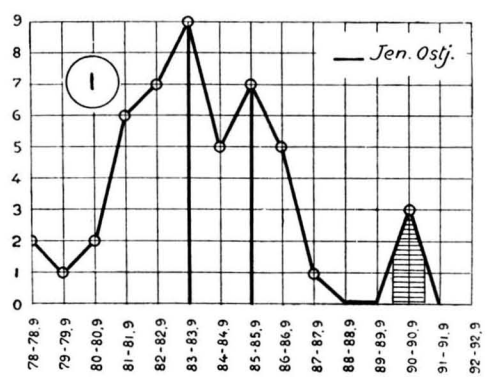
[4]) RANKE, Beiträge zur physischen Anthropologie der Baiern, 1883.

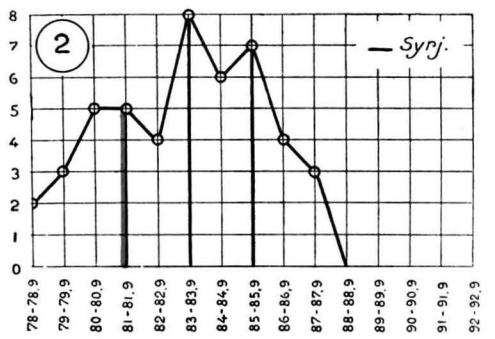
Table II

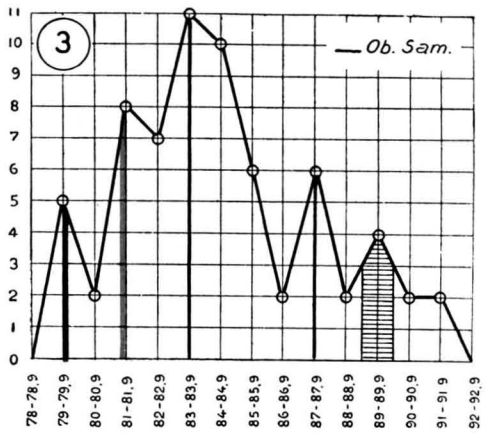

11
Norv.
Bulg.
Holl.
Greek


9
Nowg.
Germ.


7
Ob.-Ostj.


1
Jen. Ostj.


2
Syrj.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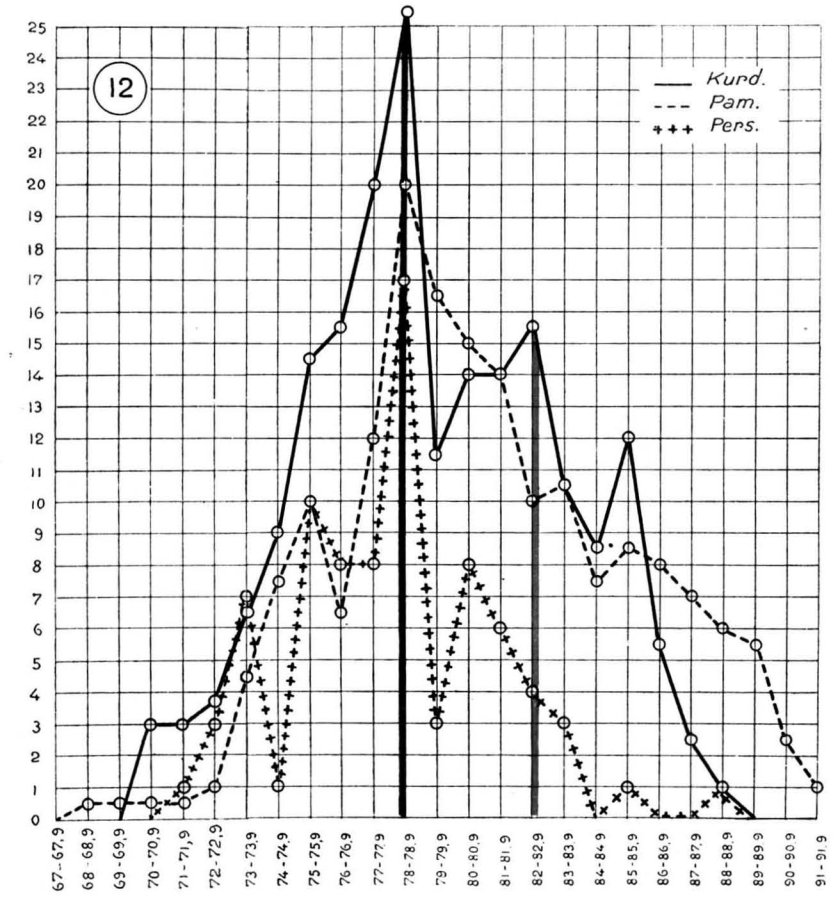
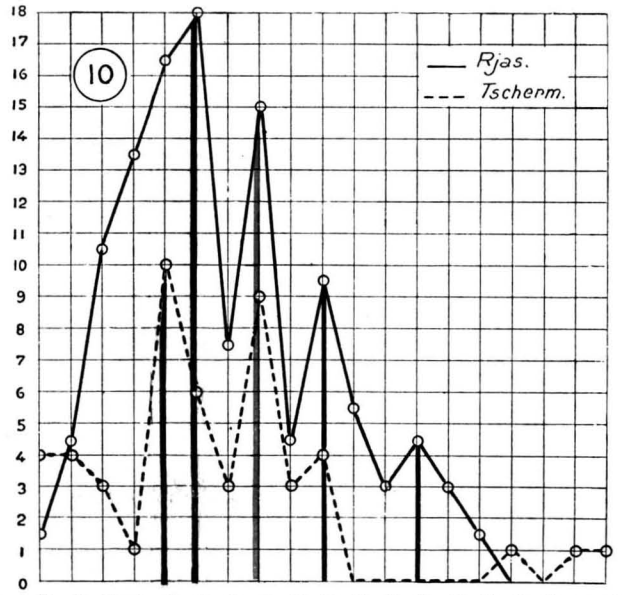
Ob. Sam.


12
Kurd.
Pam.
Pers.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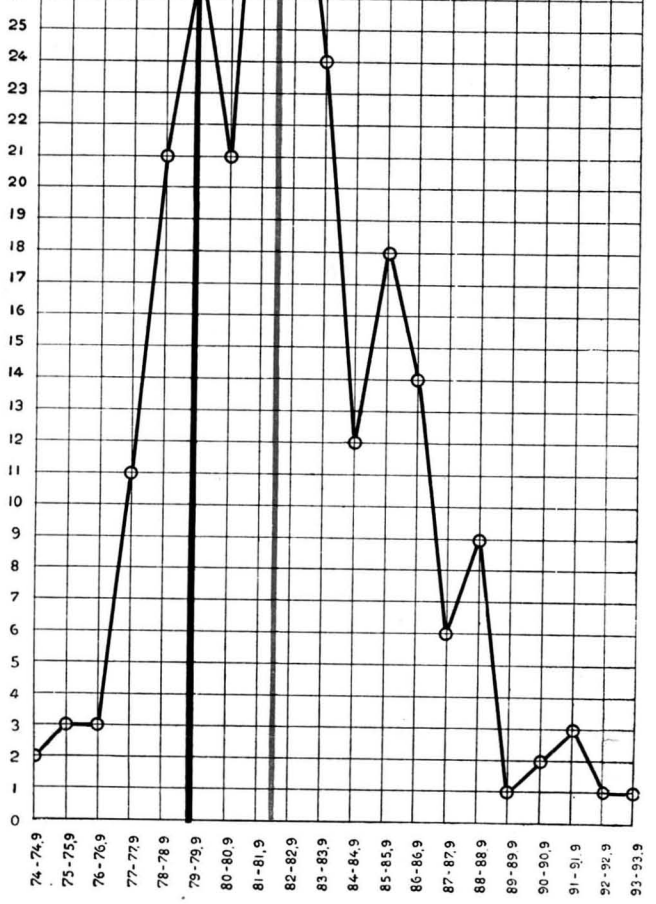
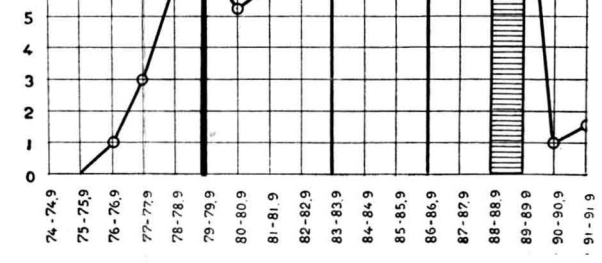
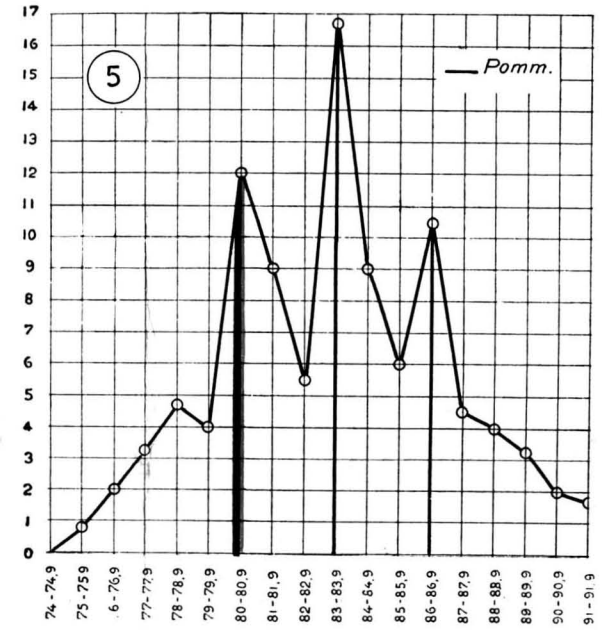
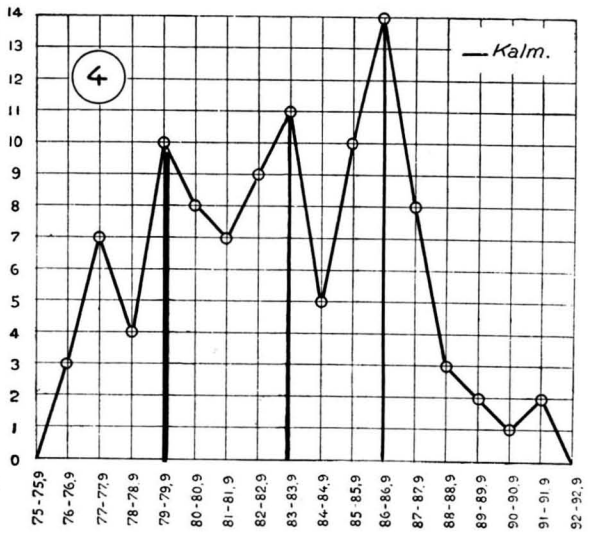
Rjas.
Tscherm.


8
Wolh.


6
Wald.


5
Pomm.


4
Kalm.

Commonly anthropologists, even those dealing with Asia, (DUDLEY BUXTON [1]), R. B. DIXON [2]), HADDON [3])) use the name Alpine race when speaking of these brachy-hyperbrachycephalic peoples. It is, however, evident that the expression central Asiatic brachycephals or — if one wants a name referring to its most typical European representatives — Dinaric race is better than Alpine.

Whereas the race in question was still very pure in the early middle ages in Alsace-Lorraine as appears from BLIND's [4]) measurements of 700 skulls (Table III, N°. 7) and is still represented — even with an additional 89 90 peak — in Auvergne (cf. the 172 skulls recorded by TOPINARD [5]): continuous line Table III, N°. 8), and may have occurred in addition to (an) other race(s) among the English round barrow people (dotted line Table III, N°. 8), Switzerland shows its representatives only in Graubünden in the so-called Dissentis type, less so in the North West. It is not strange that it occurs in this most Eastern corner of Switzerland since the influx of this people came from the East.

The type — as expressed in an index curve — is very characteristic with the 34 Dissentis skulls measured by RÜTIMEYER and HIS [6]), less so with the 41 Graubünden skulls measured by BLIND (l.c. supra). These skulls, grouped together in the two lower curves of Table III, N°. 10, even show an ultrabrachycephalic peak at 89, and this again is striking as the 86 and 87 skulls together are more numerous than the single 83 peak in this curve.

The large curve, however, constructed after WETTSTEIN's [7]) data concerning 252 skulls (Table III, N°. 10) can be accepted only with reserve as typical for our race considering the fact that the 84 cranial index peak corresponds with a 85 cephalic index and the cranial peak with a 88 cephalic one.

Nevertheless GRÜTZNER's [8]) measurements of 178 Swiss girls between 15 and 19 years from Zürich (Table III, N°. 9) show such characteristic 83 and 86 peaks that their relation to our race cannot be doubted, the less so as also here a small additional ultrabrachycephalic peak at 89 appears.

This curve, however, clearly shows that also the alpine regions of Switzerland contain a mixed population, there being in addition a very pronounced 78 and 80—81 peak among the indices of these girls.

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1) DUDLEY BUXTON, Peoples of Asia, ALFRED KNOP, New York, 1925.

2) R. B. DIXON, The racial history of man. SCRIBNER's Sons, New-York, London, 1923.

3) HADDON, Races of Man, Cambridge, University Press, 1924.

4) BLIND, Die Schädelformen der Elsässischen Bevölkerung in alter und neuer Zeit. Beitrage zur Anthropologie Elsas-Lotharingen's Heft I, Straszburg 1898.

5) TOPINARD, Eléments d'anthropologie générale.

6) RÜTIMEYER und HIS, Crania helvetica Baselu. Genf 1864.

7) WETTSTEIN, Zur Anthropologie und Ethnografie des Kreises Dissentis (Graubünden, Zürich 1902).

8) GRÜTZNER, Körperwachstum und Körperproportionen 15—19-jähriger Schweizerinnen, Zürich 1928.

Leaving aside for the moment the interpretation of these peaks and whether or not its 80 (81) peak corresponds with the 80 peak of the 175 Baden skulls recorded by MIES[1]) (Table III, N°. 10), I may refer to the fact that in the cephalic index curve of ZBINDEN's[2]) measurements of males in Luzern (and Simmenthal) a pronounced 79 and 82 peak occurs. It is, however, not my intention to deal with the anthropology of the Swiss. For this I may refer to SCHWERZ' interesting book[3]).

Index peaks at 79—81 (82) are typical for certain Russian groups as the Tscheremisses of the Volga (Table II, N°. 10: dotted line) and TSCHEPOURKOWSKY's Riasan type (the same figure, continuous line). In the males from Nowgorod (near Leningrad) the same peaks are still observed as appears from the measurements of 984 males, taken by TSCHEPOURKOWSKY and recorded in Table II, N°. 9 (continuous line), although here the 82 peak prevails, which in PARSON's[4]) 925 male Germans (dotted curve in the same figure) has became the only one.

This race is probably related to the additional groups occurring sporadically among the Syrjans, Samoyedes, Volga Kalmucks, Waldai Russians (Table II, N°. 2, 3, 4 and 6).

Most likely this (78) 79—81 (82) group is the Western representative of the Siberian races East to the Asiatic barrier: the Asiatic Eskimoes, Korjaks and Tschukschen. The curve of all the 463 Paleo-Asiatic women (Table I, N°. 13) measured by JOCHELSON-BRODSKY[5]) shows such a great resemblance with the female Russian Riasan type of TSCHEPOURKOWSKY (Table II, N°. 10 continuous curve) that a relationship can hardly be doubted. The same holds good for HELLA PÖCH's[6]) Volhynians (Table II, N°. 8).

Apparently the meso-subbrachycephalic Siberian races once extended along the whole Northern coast of Asia, descending East along the Pacific coast (cf. the Northern Chinese and Japanese curves Table I, N°. 14 and 16), and West between the Baltic and the Ural.

According to my index curves this race is widely spread in Russia and in the Caucasus and North Persia where among the Kurds and related Persians (Aderbeidjani a.o.) analogous relations are found (see for the Kurds the continuous line in Table II, N°. 12).

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[1]) MIES, Die Schädel der anatomischen Anstalt Heidelberg. Arch. f. Anthr. B. **24**, 1897.

[2]) ZBINDEN, Beiträge zur Anthropologie der Schweiz. Arch. f. Anthrop. B. **38** (N. F. 10) 1911. For these indexcurves see his paper.

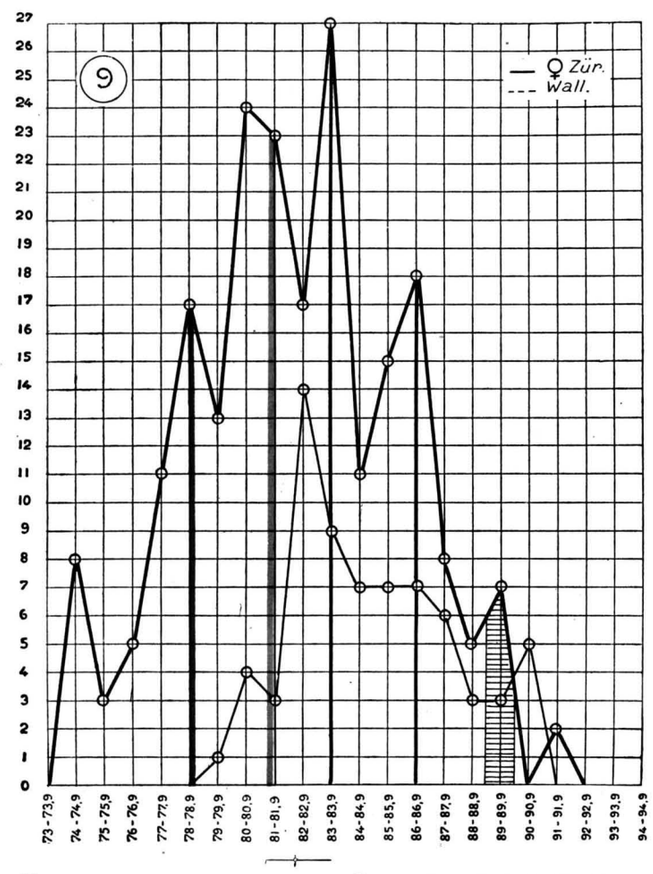
[3]) SCHWERZ, Die Völkerschaften der Schweiz von der Urzeit bis zur Gegenwart. STRECKER und SCHRÖDER, Stuttgart 1915, (see esp. p. 151).

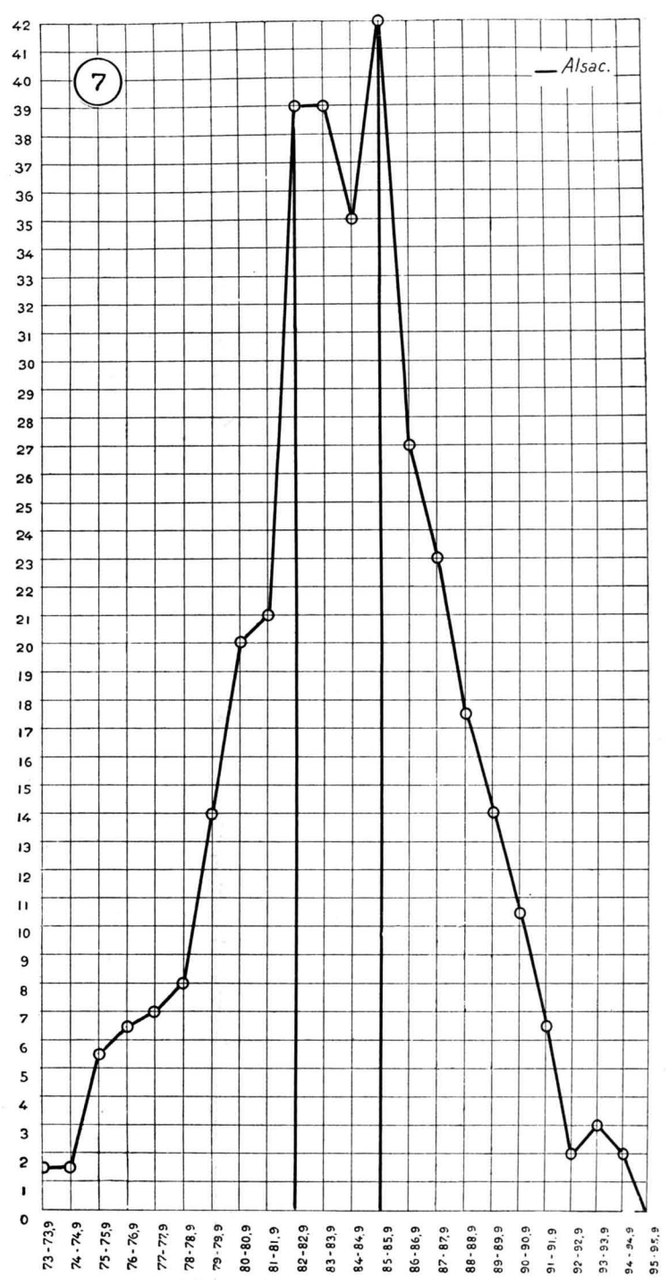
[4]) PARSON's Anthropological Studies on German prisoners of war. Journ. of the Anthrop. Inst., Vol. **49**, 1919.

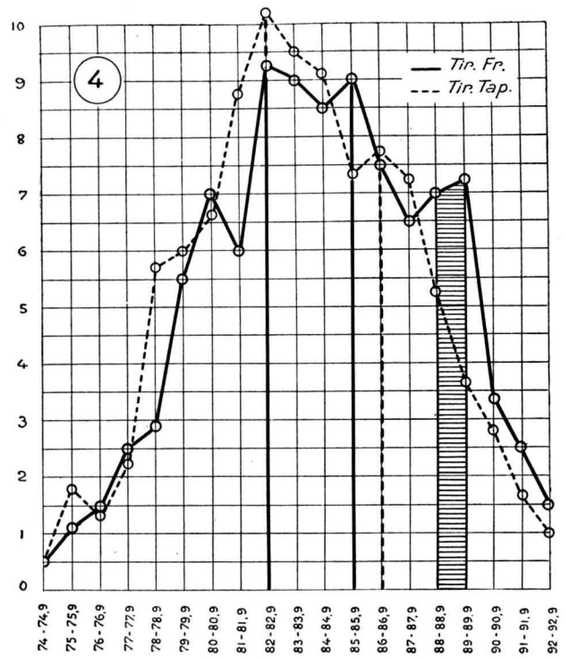
[5]) JOCHELSON-BRODSKY, Zur Topographie des weiblichen Körpers Nord- Ost Siberischer Völker. Arch. f. Anthrop. Bnd. **33**, 1906. Making this curve I left out her female Yakuts, who are obviously different.

[6]) H. PÖCH, Mitt. der Anthr. Gesellsch. in Wien, Bnd. **45—46**, 1925—'26.

Table III


9
♀ Zür.
Wall.


7
Alsac.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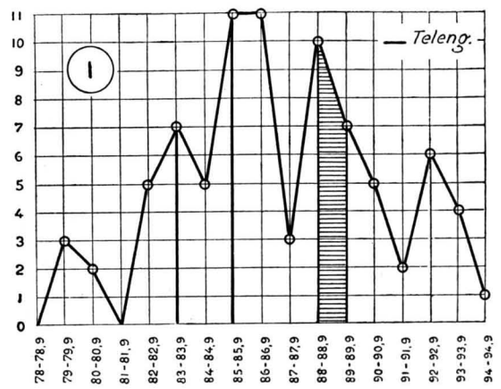
Tir. Tap.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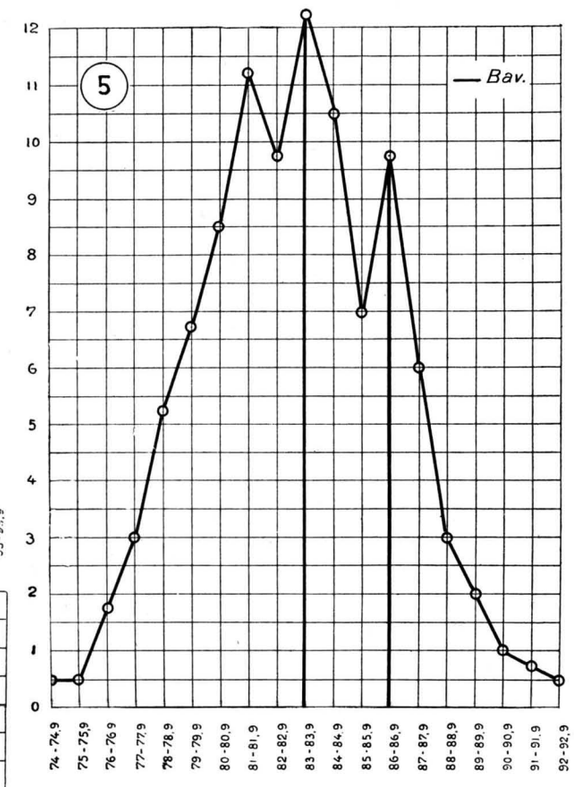
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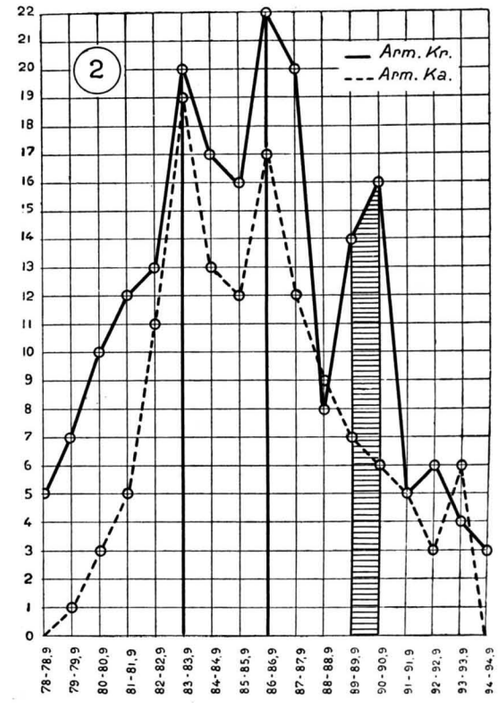
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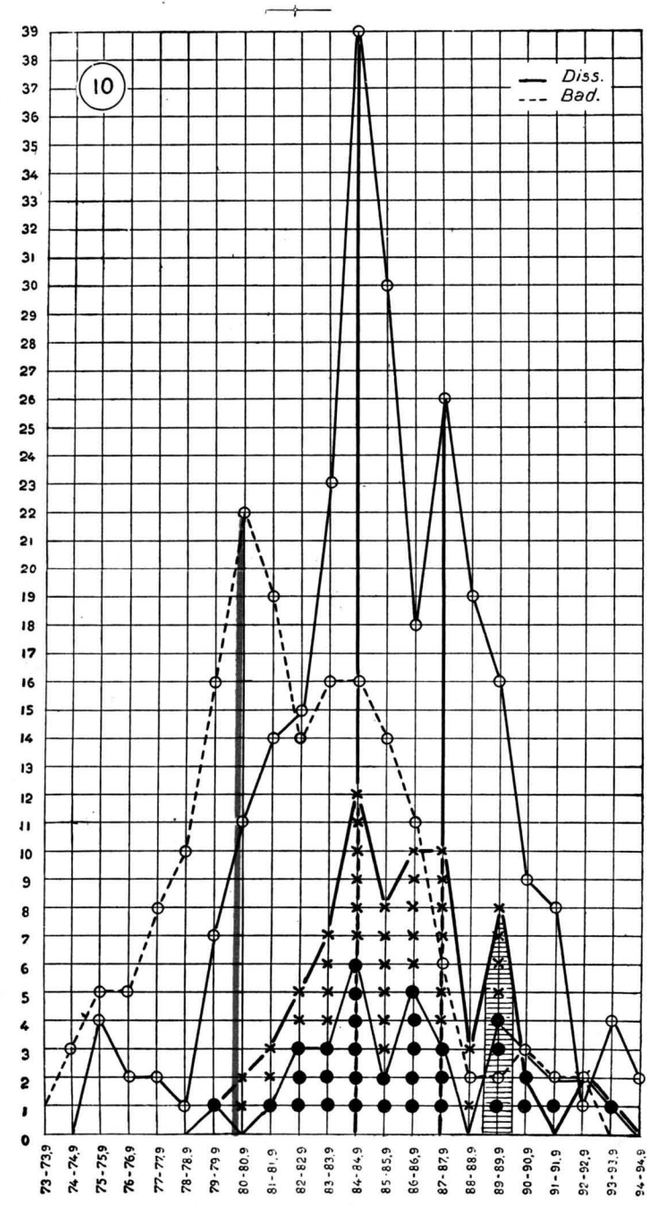
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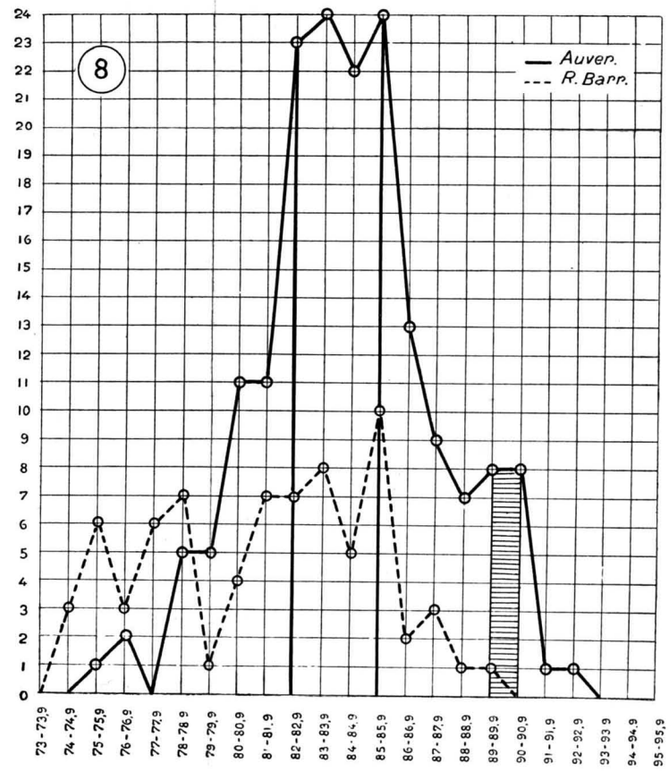
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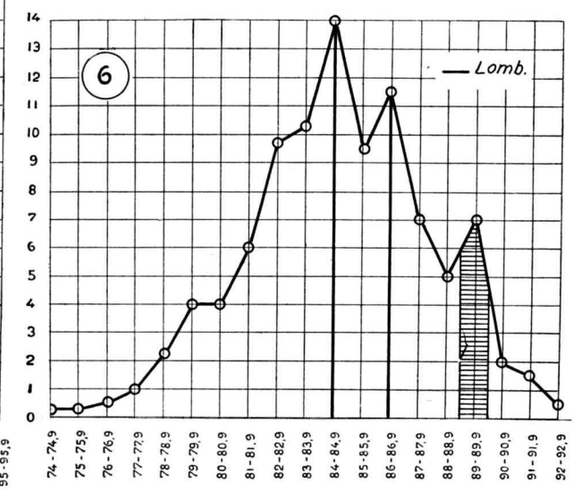
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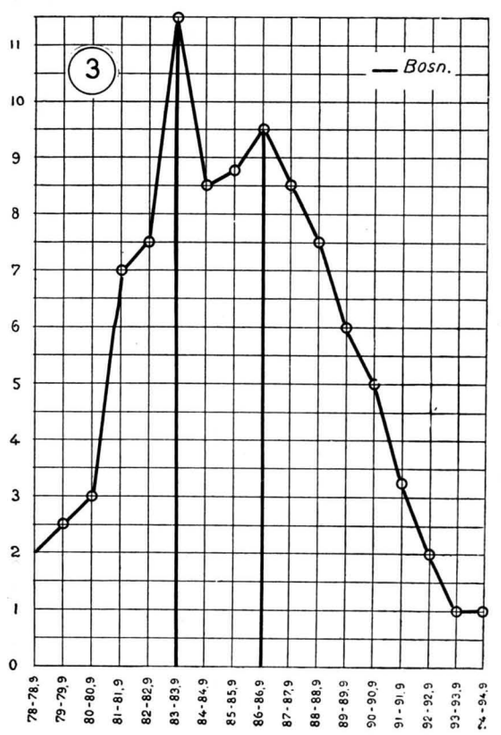
3
Bosn.

The associated occurrence of the (78) 79—81 (82) peaks South of the Caucasus also explains their occurrence among the Mesopotamian Arabs and among the Palestinian Arabs and related people, recorded in former publications. The 79—82 peaks are also characteristic of the male Jews measured by WEISSENBERG [1]) in Cologne and Frankfort on the Maine.

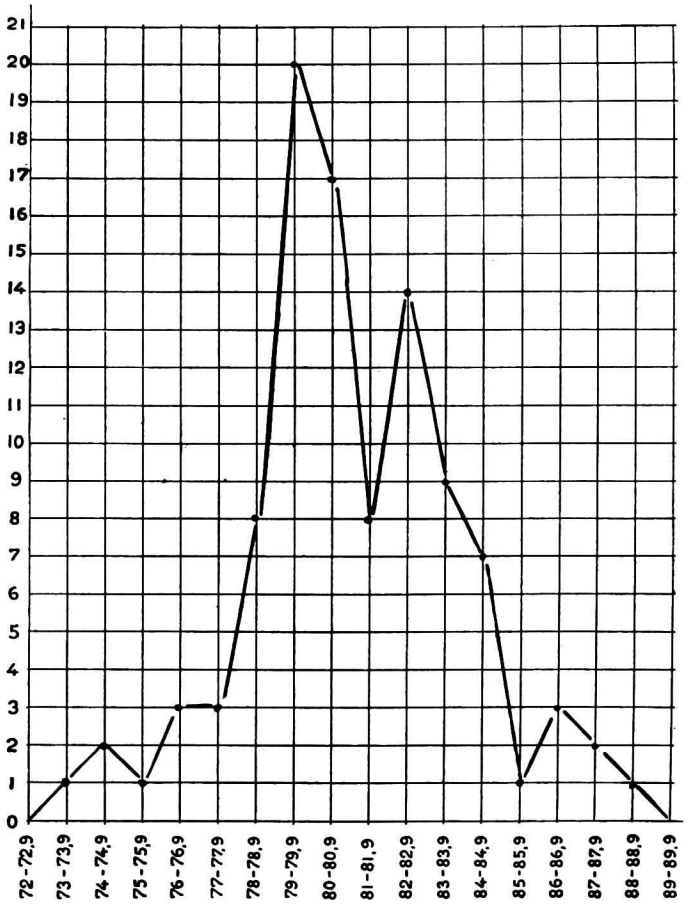

Fig. 2. Index curve of 100 male Jews measured by WEISSENBERG in Cologne and Frankfort a/M.

Similarly as we have to consider the 83 (84)—86 (87) cephalic index people as one large group occurring chiefly in Western Asia and Europe, we have to consider the (78) 79—81 (82) combination as a widely spread race. Both main races, however, the 83 (84)—86 (87) as well as the 78 (79)—81 (82) race, may show subdivisions and specialize in either one of their chief index peaks.

So we found that the 86 (87) index peak occurs isolated with the

[1]) WEISSENBERG, Zur Anthropologie der Deutschen Juden. Zeitschr. f. Ethnologie, Bnd. **44**, 1912. With the Amsterdam Askenasim I found a small peak at 78 and a very high one at 81.

Uzbeks, Lesghians, and Turks, while with the Yesidis and Mesopotamian Arabs the 83 group is by far the prevailing one [1]).

Similarly we find that the 78 (79)—81 (82) groups may crystallize in either a 78 (79) or a 81 (82) race.

This is seen in the East as well as in the West. In the East the Aino's (Table I N° 15) have a 76—78 cranial (78—79 cephalic) index, in the West the so-called Nordic, better called Norwegian race shows the same, as appears from the frequency curve of several thousands of Norwegians published by BRYN and SCHREINER [2]) (dotted line in Table II, fig. N°. 11).

Analogous relations obtain in England (PARSONS [3])) and in the Netherlands with the exception of Groningen and Zeeland; BOLK [4]). On the other hand among the Baltics the 82 index group has worked out, as appears from the Nowgorod curve. The same index prevails in the curve of 925 Germans based on PARSON's measurements (cf. Table II, N° 9).

The latter author, as well as R. B. DIXON (l.c.) and VON EICKSTEDT rightly state that the Nordic race, to which some German authors so frequently refer as being the main constituent of their people, nowadays forms a small constituent of this people (cf. also KEITER [5]), KLENCK and SCHEIDT [6])). It is prevailing only in Scandinavia, England and in the Netherlands in the provinces Holland and Friesland (BARGE [7])).

Yet far South an interesting group of the same race occurs viz. in Bulgaria and Rumania, as appears from the curve of 2000 Bulgars made by CWIRKO-GODYCKI [8]) (Table II, N°. 11, continuous curve).

As stated by J. L. MYRES [9]) the Vlachian Bulgars may be the representatives of the ancient Thrakians, who invaded pre-hellenic Hellas and in classic Greece established the majority of the population.

This Nordic type was represented also among the Scythians North of the Black Sea as it still occurs among the Iranian Persians.

That really this Nordic race may have acted a large part in the classic period of Greece appears from the small striped curve added in Table II,

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[1]) Perhaps the strong 82 peak in the index curve of skulls from the canton Wallis in Switzerland recorded by WACKER (Table III, N°. 9, dotted curve) has to be interpreted in the same way (see his paper zur Anthropologie der Walser etc., Zeitschr. f. Ethnol., Bnd. **44**, 1912).

[2]) BRYN and SCHREINER, Die Somatologie der Norweger nach Untersuchungen an Rekruten, Oslo 1929.

[3]) PARSONS, Anthropological observations on German prisoners of war. Journ. of the Anthrop. Institute, Vol. **49**, 1919.

[4]) BOLK, Kraniologische Untersuchungen an Holländische Schädel. Zeitschr. f. Morph. und Anthrop., Bnd. V, 1902.

[5]) KEITER, Schwansen und die Schlei. Schleswigsche Bauern und Fischer, Jena. Fischer, 1931.

[6]) KLENCK und SCHEIDT, Niedersächsische Bauern. Geestbauern im Elb.-Weser-Mündungsgebiet. Jena, Fischer, 1932.

[7]) BARGE, Friesche en Marker schedels. Dissertation Amsterdam, 1912.

[8]) CWIRKO-GODYCKI, Les Slaves méridionaux. Revue d'Anthropologie Année XL, '30.

[9]) J. L. MYRES, Who were the Greeks. California University Press 1930.

N⁰. 11, in which I registered all the Greek skulls of that period hitherto found. In comparing this curve with the cephalic Nordic curves in the same figure, we must realize that the cephalic index of mesocephals is one or two entities higher than the cranial one.

In order to provide a comparison with Nordic mesocephalic skulls I made a curve of the 300 skulls of the provinces Holland examined by BOLK (1 = 4 skulls) recorded in the same figure (red line). The parallelism between this curve and the Greek one is evident[1]).

Yet that the present Bulgarian group measured by CWIRKO-GODYCKI descends from the ancient Thrakians (Scytho-Iranians), who acted such a large part in the structure of the classic Greek population is not so sure, since we may remember that 1000 years after the golden age of Greece other Nordic settlers, the Goths, invaded these regions.

Whatever may be the case with these Bulgars, so much is sure that also on the Northern shores of the Black sea, the Caucasus and Persia (the plateau of Iran) in ancient as well as in recent times the 78—79 index, either combined (Kurds) or not (Bulgars and Aderbeidjani) with a 81 (82) index peak was very frequent and this Irano-Scythian people (even still numerous in the Pamirs) certainly belongs to the same groups of mesocephalics, who had such an influence on the population of Greece and Crete already in late Helladic and late Minoan, but especially in Hellenic times.

Before ending I still want to remind that in the "Introduction to the Anthropology of the Near East in ancient and recent times", attention was called to what seems to be a mutability of the index in dolichocephalic races, in the opposite sense as found with brachycephalics, since with 71 cranial index peak races as the Indo-Aryans from Central Europe examined by SCHLIZ and RECHE, the Panjabi examined by HAVELOCK CHARLES (l.c. fig. 1) and the ancient Minoan (l.c. fig. 69) as well as modern Sardinian skulls (l.c. fig. 87) examined by DUCKWORTH, in addition to an outstanding 71 index peak an 67 index peak occurs. I do not consider this peak as an indication of an admixture with another race but rather as a mutation based perhaps on a sort of leptosome constitution, that may be caused by unfavourable conditions. It fails with the Caspian Indo-Aryans examined by myself (l.c. fig. 1).

Résumé.

Resuming my results I may state that in Asia North of the Himalaya, as well as in Europe North of the Mediterranean especially two races occur. One, the brachy-hyperbrachycephalic race has spread chiefly West to the Central barrier.

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[1]) I apologize that I used a Netherland series of skulls for such a proud comparison but it was the only mesocephalic Nordic skull series at my disposal. I am convinced that BRYN and SCHREINER could provide us with a much larger one and refer also tc the cephalic index peak of English males published by PARSONS (l.c.).

In some cases the brachycephalic, in others the hyper-brachycephalic element may be the most or even the only outstanding index in this race. Furthermore those representatives of this race in which the hyper-brachycephalic 86 (87) peak prevails show a tendency to have an additional ultra-brachycephalic (89—90) peak. The occurrence of this ultra-brachycephalic peak points to a mutation that raises the question if the 83 and 86 peaks may also be mutations of each other, in this sense that in their ancestral groups both possibilities: the formation of a prevailing 83 or a prevailing 86 (87) peak occurred, the appearance of which may have depended on especial conditions: environment, food, endocrine factors, or combinations of these three factors.

East as well as West to the Central barrier the paleo-asiatic 78 (79)—81 (82) index peak race extends. Also this race may specialize either in a Nordic 78 (79) peak group or in a Baltic 81 (82) group.

As in all the cases recorded the mutability range of the index curves is about three units in the frequency peaks, this reminds us the mutation range, observed among some dolichocephalic Indo-Aryan (and Mediterranean) groups in which the prevailing 71 skull index peak is frequently complicated by a hyper-dolichocephalic (67) peak.

EXPLANATION OF CURVES [1].

TABLE I.

No. 1. Thin continuous line: male ceph. ind. in Khotan and Turfan (AUREL STEIN, JOYCE).
Thick continuous line: the same plus the ceph. indices of 37 Kirghises, measured by the same, and 242 Kirghises measured by DE UFFALVY (1 = 2).
Dotted line: 56 female Yakuts measured by Mrs. JOCHELSON BRODSKY.

No. 2. Cephalic indices of 176 male Armenians from New-Julfa near Isphahan, measured by KRISCHNER.

No. 3. Cephalic indices of 193 Alouites or Ansarieh, 145 measured by KAPPERS, 48 by CHANTRE.

No. 4. Ceph. ind. of 390 male Uzbeks measured by OCHANINE (1 = 2).

No. 5. Ceph. ind. of 163 male Lesghians measured by VON ERCKERT.

No. 6. Dotted line: ceph. index of 796 male Turks measured by VON LUSCHAN; continuous line: 138 Turks measured by KAPPERS.

No. 7. Ceph. index of 60 male Asiatic Eskimoes recorded by JOCHELSON BRODSKY; expressed in percentages.

No. 8. Ceph. ind. of 169 male Koryaks, recorded by JOCHELSON BRODSKY; expressed in percentages.

No. 9. Ceph. ind. of 148 male Tschukschen, recorded by JOCHELSON BRODSKY; expressed in percentages.

No. 10. Ceph. ind. of 76 male Tunguses, recorded by JOCHELSON BRODSKY; expressed in percentages.

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[1]) Wherever there is a difference between the number of cases mentioned in this list and the number registered in my curves this is due to the fact that — to save space — I have cut off the extremes of the spread of the curve if only few indices, not characteristic of the group, were represented in these extremes.

No. 11. Continuous line: ceph. ind. of 59 male Jakughirs, recorded by Mrs. JOCHELSON BRODSKY; expressed in percentages.
Dotted line: ceph. ind. of 137 male Yakuts, measured by HECKER.

No. 12. Continuous line: ceph. ind. of 63 male Kamtschadales, recorded by Mrs. JOCHELSON BRODSKY; expressed in percentages.
Dotted line: cranial index of 18 Aleutian skulls measured by BESSELS (15), and MONTANDON (3).

No. 13. Ceph. index of all the female N. E. Asiatics (463) measured by JOCHELSON BRODSKY (1 = 3) with the exception of her female Yakuts (registered in Table I No. 1, dotted curve).

No. 14. Ceph. ind. of 942 male Chinese, chiefly from North China (Kiangsi, Shantung, Chihli) and Manchuria; measured by KOGANEI (1 = 4).

No. 15. Cranial ind. of 191 Aino skulls, measured by KOGANEI, KOPERNICKI and others.

No. 16. Continuous line: cranial indices of 88 Japanese skulls, measured by ADACHI.
Dotted line: the same plus 10 skulls measured by TOLD, and 4 measured by BLIND.

TABLE II.

No. 1. Ceph. ind. of 48 male Jenessei-Ostyaks, measured by ANUTCHINE.

No. 2. Ceph. ind. of 49 Syrjans (25 males and 24 females), measured by SOMMIER.

No. 3. Ceph. ind. of 67 male Ob-Samoyedes, measured by SOMMIER.

No. 4. Cranial (or cephal.?) indices of 104 Kalmucks recorded by DENIKER.

No. 5. Cephalic ind. of 189 Pomeranian young men, measured by REUTER.

No. 6. Cephalic index curve of female Waldai Russians recorded by TSCHEPOURKOWSKY; expressed in percentages.

No. 7. Ceph. ind. of 109 Ob-Ostyaks, measured by SOMMIER.

No. 8. Ceph. ind. of 246 male Volhynians from the Ukraine, measured by HELLA PÖCH.

No. 9. Continuous line: ceph. ind. of 984 males from the gouvernment Nowgorod, measured by TSCHEPOURKOWSKY (1 = 5);
dotted line: ceph. ind. of 925 male Germans measured by PARSONS (1 = 5).

No. 10. Continuous line: Ceph. ind. of the female Rjasan Russians, measured by TSCHEPOURKOWSKY; expressed in percentages.
Dotted line: ceph. index of 50 male and female Tscheremisses from the Volga, measured by SOMMIER.

No. 11. Dotted line: Ceph. index curve of several thousands of Norwegian males measured by BRYN and SCHREINER, expressed in percentages;
continuous line: ceph. ind. of 2000 Bulgars measured by CWIRKO-GODYCKI; expressed in percentages.
Red line: cranial index of 300 skulls from the province Holland, measured by BOLK (1 = 4).
Striped line: cranial index of 53 Hellenic skulls (dots) of the classic period, measured by various authors.

No. 12. Continuous line: cephalic index of 378 male Kurds (272 measured by CHANTRE, 106 by KAPPERS).
Dotted line: ceph. ind. of the largely mesocephalic groups of the Pamirs recorded by Sir AUREL STEIN and JOYCE. (354 males).
Crossed curve: ceph. ind. of 81 female Persians from Isphahan measured by Mrs. M. KRISCHNER.

TABLE III.

No. 1. Cranial ind. of 82 Altai Telengete skulls, measured by REICHER.

No. 2. Continuous line: ceph. ind. of 200 female Armenians, measured in Beirut by KRISCHNER.
Dotted line: ceph. ind. of 136 chiefly male Armenians, measured by KAPPERS in Beirut and Constantinople.

No. 3. Ceph. ind. of 4752 male Bosnians, measured by CWIRKO-GODYCKI; expressed in percentages.

No. 4. Continuous line: cranial indices of 1124 Tirolese skulls measured by FRIZZI.
Dotted line: cranial ind. of 1319 Tirolese skulls measured by TAPPEINER.
Both expressed in percentages.

No. 5. Cranial ind. of 1000 Bavarian skulls, measured by RANKE; expressed in percentages.

No. 6. Ceph. ind. of 36202 male Lombardians, measured by LIVI; expressed in percentages.

No. 7. Cranial indices of 700 mediaeval skulls from the Alsace, measured by BLIND.

No. 8. Continuous line: cranial ind. of 172 Auvergnate skulls, recorded by TOPINARD.
Dotted line: cranial index of 74 English Round Barrow skulls, recorded by the same.

No. 9. Continuous: Ceph. ind. of 214 girls from 15—19 years, measured at Zürich by GRÜTZNER.
Dotted line: cranial index of 69 skulls from Vorarlberg (Wallis), measured by WACKER.

No. 10. Lower (thin) continuous line (dots): cranial index of 33 Dissentis skulls, measured by RÜTIMEYER and HIS. Second (thicker) continuous line: the same plus the cranial ind. of 41 Graubünden skulls, measured by BLIND (crosses).
High continuous line: cranial indices of 252 Dissentis skulls measured by WETTSTEIN.
Dotted line: cranial indices of 175 Baden skulls, measured by MIES.

Physics. – *Measurements about the velocity of sound in neon gas.* By W. H. KEESOM and J. A. VAN LAMMEREN. Abstract of Communication No. 234c from the Kamerlingh Onnes Laboratory.

(Communicated at the meeting of October 27, 1934).

The velocity of sound in neon gas has been measured from 0° C down to liquid neon temperatures. Therefor a new vapour cryostat for obtaining the last mentioned temperatures was designed.

From the measurements down to liquid oxygen temperatures, making use of values of B (the second virial coefficient) deduced by CATH and KAMERLINGH ONNES, values of C_p/C_v for $p=0$ were calculated. The results agree within 0.2 % with the expected value 1.667.

At the temperatures 27.80 and 26.25° K the dependence of the velocity of sound on pressure was investigated.

From the results in combination with CATH and KAMERLINGH ONNES' values of B the following values were calculated:

T (°K)	30	40	50	60	70	80
$-10^3\ B$	4.40	2.48	1.55	1.02	0.68	0.46