

Some comments on the problem of gracilization

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Summary

The relationship between gracilization and neolithization is more irregular and complicated than is usually supposed.

1. There is at least one fully gracilized and one partially gracilized population sample in the mesolithic period (Mugem, Volosskoye)
2. In the Ukraine and Zvejnicki, the mesolithic samples are more gracile than the neolithic ones.
3. The onset and tempo of gracilization are different in eastern and western Europe.
4. In several cases (Zvejnicki, Vasilevka, Lepenski Vir) the differences between mesolithic and neolithic samples point to the contribution of migrations and population replacements.

Résumé

Le rapport entre gracilisation et néolithisation est plus irrégulier et compliqué qu'on ne le suppose habituellement.

1. *Il y a au moins un échantillon de population complètement gracilisé et un autre, partiellement, à la période mésolithique (Mugem, Volosskoye).*
2. *En Ukraine et à Zvejnicki, les échantillons mésolithiques sont plus graciles que les néolithiques.*
3. *Le début et le tempo de la gracilisation diffèrent dans l'Europe orientale et occidentale.*
4. *Dans plusieurs cas (Zvejnicki, Vasilevka, Lepenski Vir), les différences entre échantillons mésolithiques et néolithiques laissent supposer une contribution de migrations et de remplacements de populations.*

In physical anthropology, the term "gracilization" is primarily used to express a continuous diachronic decrease in bone robusticity; however, and with particular respect to more recent periods since the mesolithic age, it has been predominantly used to describe decreases in measurements i.e. of stature, and of skull and tooth diameters. Using data from the northern and southern parts of European Russia, the late Soviet anthropologist Debetz (1964) demonstrated for the first time that gracilization is an important phenomenon not only in the evolution of *Homo sapiens* but also in prehistoric populations. He also pointed out the connection between this process and neolithization, i.e. the switch of hunter-gatherers to a sedentary and agrarian way of life. Comparing mesolithic and neolithic populations, Kurth (1955) had the same idea but he only mentioned it and, in contrast to Debetz, did not give any systematic documentation. Schwidetzky (1962, 1969) immediately took up Debetz'ideas and offered more data and a hypothesis on the selective factors at work. In recent decades many other authors have described the process of gracilization for different countries and periods (Carlson and van Gerven, 1977; Ferembach, 1978; Frayer, 1980; Henneberg, 1988; Menk, 1977; Olivier,

1969; Wierciński, 1985; *et al.*).

A new compilation of data and statistical analyses on neolithic and bronze age skull samples was carried out recently (Schwidetzky and Rösing, 1989); an examination of the dendrogram and tables once again causes gracilization to stand out. Four periods are distinguished: I. Before 4000 (20 samples); II. ca. 4000-3000 (24 samples); III. ca. 3000-2000 (79 samples); IV. 2000-1000 (66 samples). Penrose distances and dendrograms were used to structure the data in order to ensure comparability with statistical studies on later prehistoric periods. Basic multivariate comparisons were carried out for each of the 4 periods, with 10 skull measurements (Martin : 1, 8, 9, 17, 45, 48, 51, 52, 54, 55). Additional statistical information was yielded by the calculation of the statistical parameters (\bar{x} , sm) of the clusters distinguished, as well as by univariate comparisons of the clusters by means of the *t*-test and the calculation of the levels of significance (*p*). There are highly significant differences between the two clusters from periods I (Mesolithic) and II (predominantly Neolithic). These are called gracilization markers; the most important is bizygomatic breadth, followed by skull length, bigonial breadth and orbital breadth.

	45	1	66	51
Vasilevka 1+3, Mesol.	140,0 (26)	193,6 (25)	101,5 (24)	43,0 (24)
Vasilevka 2, Neol.	153,6 (9)	189,9 (10)	114,8 (8)	47,6 (8)
Dnepr-Donetz-culture				
early phase ⁽¹⁾	146,8 (67)	193,8 (108)	113,0 (55)	45,0 (69)
late phase ⁽²⁾	144,1 (23)	195,3 (23)	108,3 (23)	44,6 (23)
Zvejnicki, Mesol.	136,9 (11)	187,6 (12)	—	43,6 (11)
Early Neol.	139,1 (12)	190,4 (14)	—	44,7 (11)
Middle and Late Neol.	139,9 (27)	188,1 (35)	—	44,2 (35)
Drevne Yamnaya, Ukraina	136,7 (59)	193,2 (92)	—	43,6 (61)
Catacomb culture, Ukraina	137,0 (117)	187,2 (150)	—	42,9 (126)
Drevne Yamnaya, Volga	140,2 (16)	191,6 (21)	—	43,5 (18)
Catacomb culture, Volga	137,5 (13)	188,2 (16)	—	43,9 (16)
Iron gate, Protoneol. ⁽³⁾	141,8 (12)	191,7 (21)	107,0 (9)	42,4 (16)
Starchevo-culture ⁽⁴⁾	131,0 (4)	188,5 (13)	99,3 (8)	39,7 (8)
Linear Ceramics, Centr. Germ.	131,4 (33)	188,6 (40)	98,6 (33)	41,0 (34)
Rössener culture, Centr. Germ.	127,4 (12)	187,4 (19)	—	40,0 (3)

(1) Dereivka, Vovnigi, Vasilevka 2, Nikolskoje

(2) Volnoje, Aleksandrija

(3) Lepenski Vir Protoneol., Vlasač

(4) Lepenski Vir Neol., Vinča

Table 1 : Main metric gracilization markers of some samples : \bar{x} and (number of individuals) (45: Bizygomatic breadth; 1:skull length; 66:bigonial width; 51: orbital breadth)

Table 1 includes some of the data from the table of averages compiled by Schwidetzky and Rösing (1989). It tries to compare samples from the same sites, regions or cultures, but within different time brackets. A preliminary remark seems to be useful. In principle, gracilization should mean diachronic change within a population, i.e. across genetically connected generations. This being the case, there should be an overlap in the distribution of individuals across the different times brackets. The replacement of a robust population by a more gracilized one — by migration for example — is quite another process.

Unfortunately, few cases exist where human remains from the same site fall within different time brackets within the periods considered here : Vasilevka, Zvejnicki, Lepenski Vir; also, there are only a few which belong to the same restricted region or/and the same culture: the early and late phases of Dnepr-Donetz culture; Iron gate-Starchevo culture. The other sequences in table 1 represent cases in which continuity of population is highly probable according to archeological finds, but where the skull samples come from many sites covering a rather vast area; i.e. the Linear ceramics-Rössener culture from Central Germany and the sequence of Drevne-Yamnaya and Catacomb culture in the Ukraine and the Volga region.

In an earlier paper (Schwidetzky, in press) on the

first period (before 4000) it is shown that the relationships between gracilization and neolithization are apparently more complicated than had been previously supposed : Mugem has been described as a fully gracilized, and Volosskoye as a partially gracilized sample. On the other hand, in the Iron gate case, the protoneolithic and the neolithic individuals are so strictly differentiated by the two main gracilization markers (bizygomatic breadth and skull length) that only replacement could be involved, and not local gracilization. If we look at table 1, more complications are to be seen. In both the Ukraine (Vasilevka) and Zvejnicki the mesolithic samples are more "gracile" than the neolithic ones. Figure 1 shows the distribution of individuals for the two main gracilization markers. We see that the field with the highest gracilization level is occupied by individuals from mesolithic Vasilevka 3. Soviet anthropologists thus consider that the very robust Dnepr-Donetz-people (Vasilevka 2) may have been immigrants from the North, where there is a very robust type in some of the samples of the Pit-comb-ceramics (see Bunak, 1976; Debetz, 1973; Gochman, 1966). In Zvejnicki too, the greater robusticity of early neolithics could be explained by the immigration of Pit-comb-people from the East; the mesolithics are representatives of the Kunda culture, with northern affinities (Denisova, 1975; Mark, 1970; Schwidetzky, 1986).

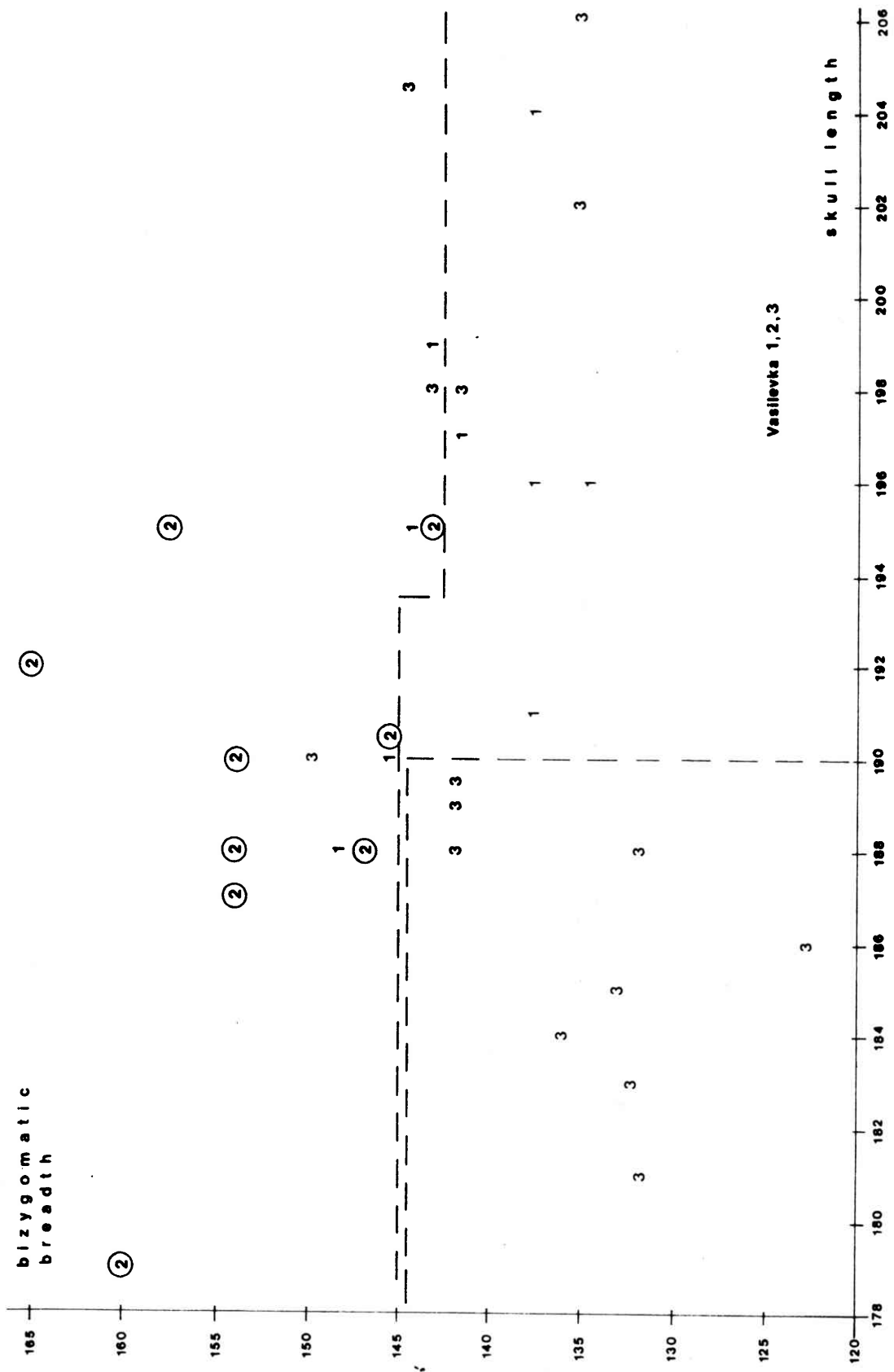


Fig. 1: Main gracilization markers. Distribution of individuals. Vasilevka 1, 2, 3.

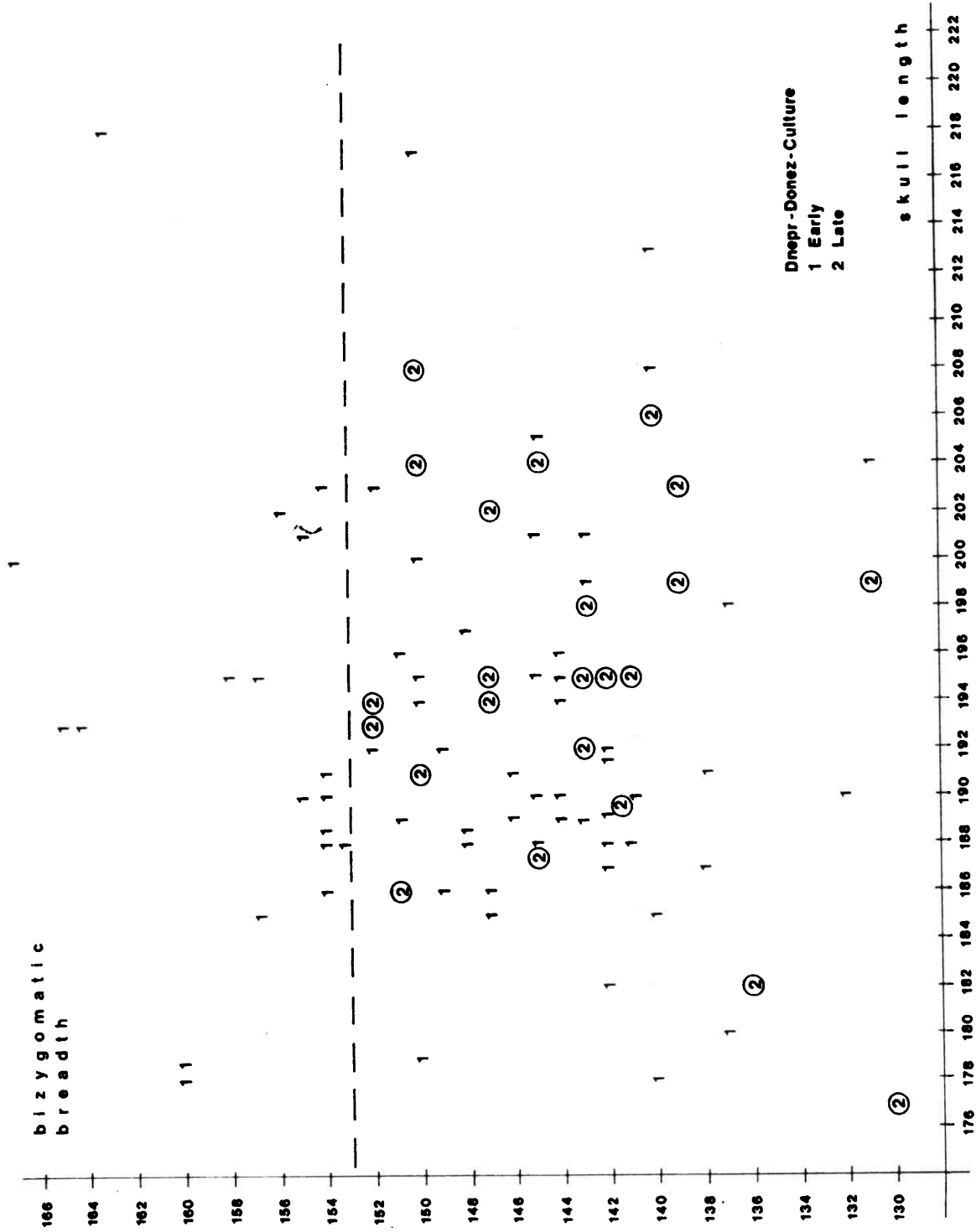


Fig. 2: Main gracilization markers. Distribution of individuals. Dnepr-Donetz-culture, early and late phase.

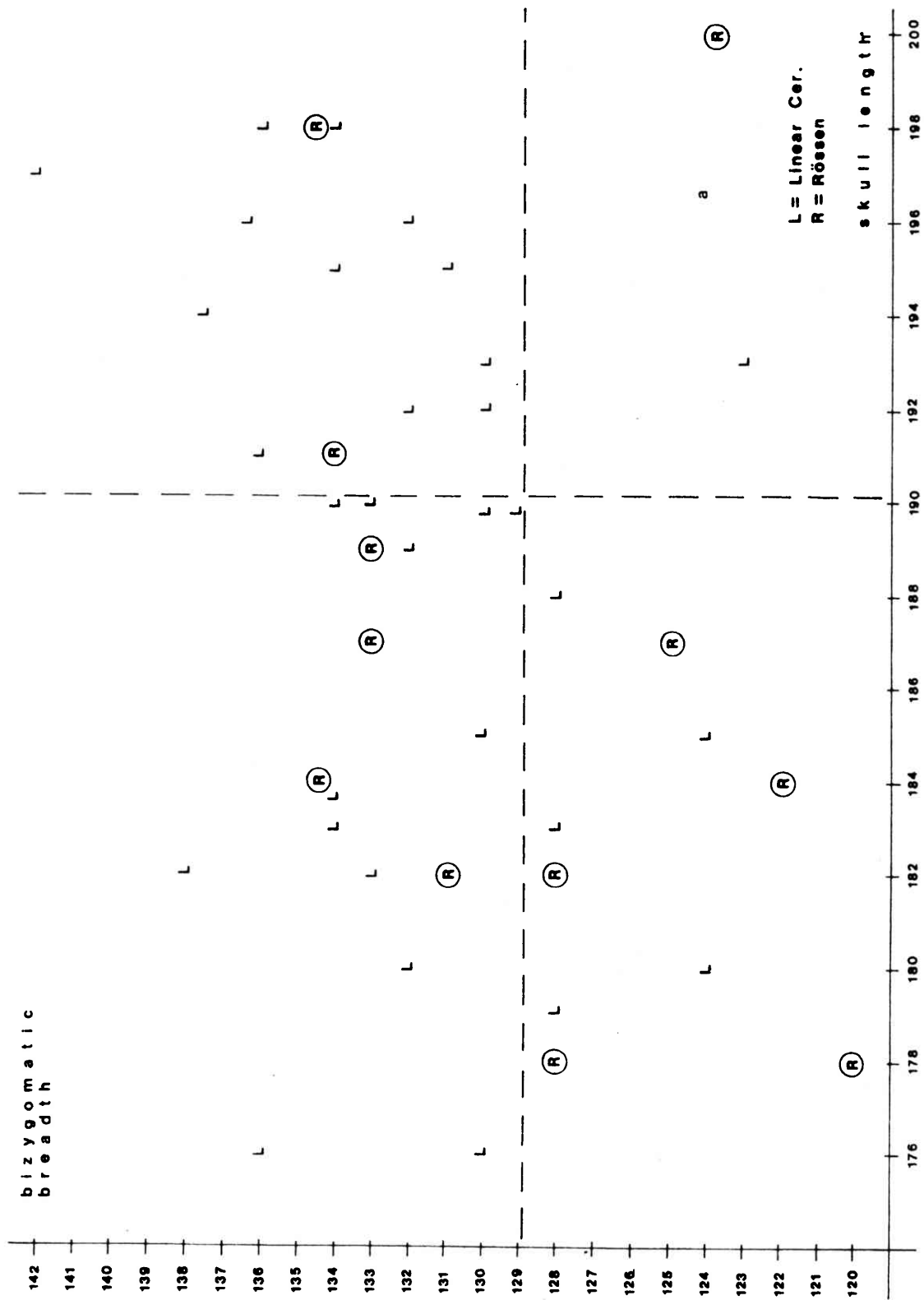


Fig. 3: Distribution of individuals. Linear ceramics, Rössen.

There are cases, however, where local gracilization seems to have taken place: such cases are the early and late phases of the Dnepr-Donetz-culture in the Ukraine, and the Linear Ceramics-Roessener culture in Central Germany. Also, the sequences from Drevne-Yamnaya to Catacomb culture in southern Russia probably represent population continuity.

If we consider the distribution of individuals in terms of the main gracilization markers in the Dnepr-Donetz culture we see that the transition from the earlier to the later phase is represented primarily by the disappearance of the very high bizygomatic breadth values; values above 152 are restricted to the earlier phases. The variability range of skull length shows much more similarity in the two phases.

The same comparison has been carried out for the two Central German samples (figure 3) which do not display any marked differences between the two gracilization markers. This agrees with an earlier result. If we take bizygomatic breadth as the main marker, there are differences between eastern and western Europe in the onset and tempo of gracilization (figure 4).

This is a short descriptive contribution to the problem of gracilization. Today, however, studies of the causative factors are accorded greater value (Grupe, 1989). At the present moment there are none that are really satisfactory, though the nutrition hypothesis is particularly attractive. Further studies on this subject should also consider geographical and diachronic differences in the gracilization process.

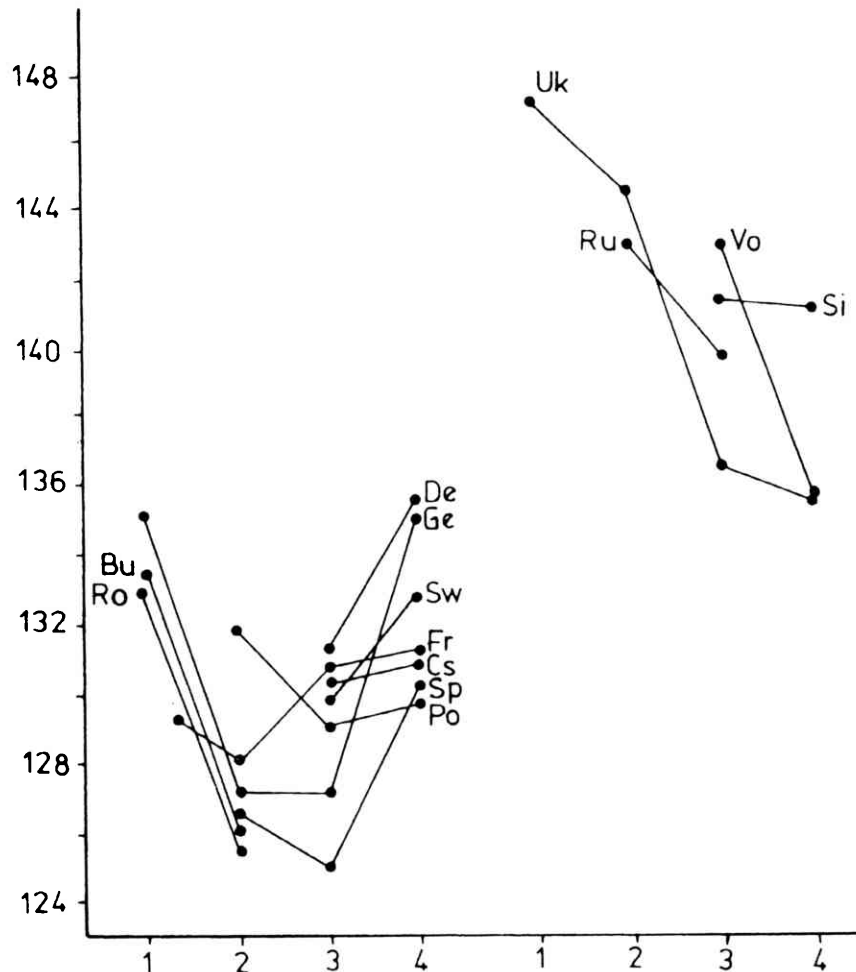


Fig. 4: Diachronic changes of bizygomatic breadth in Western (left) and Eastern (right) Europe. 1, 2, 3, 4: Neolithic periods.

Bu:Bulgaria; **Cs:**Czechoslovakia; **De:**Denmark; **Fr:**S. France; **Ge:**M. Germany; **Po:**Poland; **Ro:**Rumania; **Sp:**Spain; **Sw:**Sweden; **Ru:**N. Russia; **Si:**W. Siberia; **Vo:**Volga territory; **Uk:**Ukraine.

Bibliography

- BUNAK, V.V., 1976. Rassengeschichte Osteuropas. In : I. Schwidetzky (Hrsg.) : *Rassengeschichte der Menschheit*. 4. Lfrg., München-Wien : 7-101.
- CARLSON, D.S. and VAN GERVEN, D.P., 1977. Masticatory function and post-pleistocene evolution in Nubia. *Am. J. phys. Anthrop.*, **46** : 495-506.
- DEBETZ, G.F., 1964. Certains aspects des transformations somatiques de l'*Homo sapiens*. Communications de la Délégation Soviétique au IV^e Cong. Internat. des Sci. Anthrop. et Ethnol. Moscou : 3-25.
- DEBETZ, G.F., 1973. Die Sowjetunion. In : I. Schwidetzky (Bearb.) : *Anthropologie*. 1. Teil. Fundamenta Reihe B, Band 3, Teil VIIIa. Köln-Wien : 153-169.
- DENISOVA, R., 1975. *Antropologija drevnich baltov*. Riga.
- FEREMBACH, D., 1978. Nutrition et évolution morphologique : application au passage Magdalénien-Mésolithique en France et à la différenciation de populations natoufiennes en Israël. *Homo*, **29** : 1-6.
- FRAYER, D.W., 1980. Sexual dimorphism and cultural evolution in the Late Pleistocene and Holocene of Europe. *J. hum. Evol.*, **9** : 399-415.
- GOCHMAN, I.I., 1966. *Naselenie ukraïny v epochu mesolita i neolita*. Akad. Nauk. SSSR, Inst. Etnogr. Moskva.
- GRUPE, G., 1989. Gracilisation und Ernährung-Ursache oder Wirkung ? *Homo*, **40** (4).
- HENNEBERG, M., 1988. Decrease of human skull size in the holocene. *Hum. Biol.*, **60** : 395-405.
- KURTH, G., 1955. Zum Anteil von Erbanlage und Modifikation in der Ausprägung des Geschlechtsdimorphismus wie auch Gruppenunterschieden am Gliedmassenskelett mesolithischer Funde. *Homo*, **6** : 52-65.
- MARK, K., 1970. *Zur Herkunft der finno-ugrischen Völker vom Standpunkt der Anthropologie*. Tallinn.
- MENK, R., 1977. La néolithisation : impact de l'innovation culturelle sur la biologie et la dynamique des populations. *Arch. suisses Anthrop. gén.*, **41** : 31-36.
- MIKIĆ, Ž., 1981. Die neolithische Bevölkerung vom Eisernen Tor (Djerdap). *Homo*, **32** : 26-43.
- OLIVIER, G., 1969. L'évolution séculaire des populations subfossiles et récentes. *Symp. Biol. Hung.*, **9** : 65-72.
- SCHWIDETZKY, I., 1962. Das Gracilisationsproblem. Ein Brückenschlag zwischen Rassengeschichte und Konstitutionsforschung. *Homo*, **13** : 188-195.
- SCHWIDETZKY, I., 1969. Gracilisation und Degracilisation. Merkmalsstatistische Untersuchungen zur Anthropologie des Neolithikums. *Homo*, **20** : 160-174.
- SCHWIDETZKY, I., 1986. Die Ethnogenese der Finno-Ugrier. In : W. Bernhard und A. Kandler (Hrsg.) : *Ethnogenese europäischer Völker*. Stuttgart : 375-389.
- SCHWIDETZKY, I. and RÖSING, F.W., 1989. Vergleichend-statistische Untersuchungen zur Anthropologie der Bronzezeit. *Homo*, **40** (4).
- WIERCINSKI, A., 1985. Bioanthropological consequences of the "neolithic revolution". *Studies in phys. Anthrop.*, **8** : 105-110.

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