

A proposal for a chorotype classification of the Near East fauna, in the framework of the Western Palearctic region ¹

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SUMMARY

The distribution patterns of the Anatolian and, more generally, of the Near East fauna were analysed. As a result of the comparison of over 3,000 geographical ranges of terrestrial and freshwater animal species, a classification of chorotypes is proposed. The Near East chorotypes are also examined in the general framework of the Western Palearctic fauna, in accordance with a previous research focused on the Italian Peninsula, here revised and updated. The following taxonomic groups have been studied by a team of specialists: Chilopoda, Coleoptera (Carabidae, Hydraenidae, Phalacridae, Nitidulidae, Kateretidae, Scarabaeoidea, Meloidae, Oedemeridae, Tenebrionidae, Chrysomelidae), Amphibia and Reptilia. The map of each distribution pattern, as well as numerical and letter codes useful for tables, faunistic checklists and software databases, is given.

INTRODUCTION

The geographical distribution of plants and animals may be synthetically expressed by chorotypes. These are the items of a classification based on

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distribution patterns such as deduced from the comparative analysis of the geographical ranges of species, genera and higher taxa.

Chorotypes were widely used by a number of botanists (*e.g.*, Meusel, 1943; Walter, 1954; Meusel et al., 1965; Holub and Jirásek, 1968; Walter and Straka, 1970; Arrigoni, 1974; Pignatti, 1976) and zoologists (*e.g.*, Ghigi, 1913; Holdhaus, 1929; Gridelli, 1930, 1933, 1939, 1950, 1953; Bodenheimer, 1935; Koch, 1948; Voous, 1960; La Greca, 1964, 1975; Boano and Bricchetti, 1989; Boano et al., 1990; Hesselbarth et al., 1995; Krasnov and Shenbrot, 1998).

However, not all the authors followed the same criteria either with regard to the meaning of the chorotype concept or to the choice of the terms used for naming the chorotypes themselves. Thus, a given chorological term could be used by different authors (sometimes by the same author in different contexts) to indicate: (1) a recurrent type of merely geographical distribution; (2) an assemblage of species with certain ecological requirements within a given geographical area; (3) an assemblage of species supposed to share a common biogeographical history; (4) groups of species supposed to be phylogenetically related and originated in the same area; (5) an assemblage of species restricted to a given biogeographical region, as recognised by climatic and phytogeographical criteria (*cf.* Arrigoni, 1974; La Greca, 1975).

The present approach agrees with the first of the criteria above mentioned, being similar to that forwarded by La Greca (1964, 1975), who claimed the importance of defining categories based on the similarity of distribution patterns shared by a great number of species and thus statistically meaningful. In other words, our descriptive approach is not aimed at explaining the specific set of factors which influenced the present-day distribution of a species. The similarity among taxon ranges could be connected with different events in terms of both paleogeography and ecological dynamics, such as those of vicariance from original biota, and distinct or common dispersal episodes. On the other hand, as the geographic range is the fundamental unit in biogeography, a classification based on an explicit and univocal terminology is an important frame of reference for any further comparative study (*cf.* Krasnov and Shenbrot, 1998).

Almost ten years ago, a team of Italian zoologists under the leadership of A. Vigna Taglianti, made a joint effort to compare many geographical ranges of terrestrial and freshwater living animals belonging to several taxonomic groups of which they were experienced specialists. The comparative analysis led to a revision of the chorological patterns used for the Western Palearctic fauna (Vigna Taglianti et al., 1993) until then. A new chorotype classification was proposed on the grounds of modern criteria: (1) to define a restricted number of chorotypes fit to describe all the distribution patterns of terrestrial and freshwater animals living in the Western Palearctic region; (2) to eliminate all the terms ambiguous and prone to misinterpretation; (3) to overcome any "Eurocentric" terminology, drawing

attention to the actual main extension of each chorotype (*i.e.*, its geographic “gravitation”); (4) to arrange numerical and letter codes especially useful for computerised databases and for practical comparisons in faunistic and biogeographic researches.

Such a “new” classification was then used and discussed by several zoologists of other research groups (*e.g.*, Parenzan, 1994; Bertolani et al., 1994; Pandolfi et al., 1994; Cobolli et al., 1996; Bernini and Magari, 1996; Poggi, 1996; Mifsud and Scupola, 1998).

In the context of biogeographical studies on the Anatolian region, the aim of the present work is to give a new and improved version of the former paper on the main Western Palearctic chorotypes (Vigna Taglianti et al., 1993). Seven new chorotypes emerged from the study of many species belonging to several animal groups of the Near East fauna. Moreover, the species endemic to Near and Middle East countries received special attention, and recurrent patterns of endemic distribution were listed for these areas. Thus, we hope our work will also provide an useful tool in biogeographical researches on the Near East fauna.

MATERIALS AND METHODS

The present work is based on information from several databases belonging to the specialists involved in the team-work. The primary literature was critically revised by the specialist of each taxonomic group and integrated with unpublished data. The priority was given to taxa well investigated with regard to both systematic arrangement and geographic range. For each species, only the primary area of the range was considered, thus avoiding to include regions where the species could have been introduced by man.

The distribution patterns were mostly drawn for a great number of species selected from the following taxonomic groups: Chilopoda (M. Zapparoli), Coleoptera Carabidae (A. Vigna Taglianti), Coleoptera Hydraenidae, Phalacridae, Nitidulidae and Kateretidae (P.A. Audisio, A. De Biase), Coleoptera Scarabaeoidea (G.M. Carpaneto, E. Piattella), Coleoptera Meloidae and Oedemeridae (M.A. Bologna), Coleoptera Tenebrionidae (S. Fattorini), Coleoptera Chrysomelidae (M. Biondi), Amphibia and Reptilia (M.A. Bologna, G.M. Carpaneto, R. Sindaco, A. Venchi).

The chorotype geographical labels were mostly designated according to the Encyclopaedia Britannica (1997) and do not exactly refer to political borders. Each name has thus been chosen considering the widest area of a country included in the chorotype boundaries. When possible, physical geographical terms rather than political ones were preferred. A brief definition of some more or less ambiguous geographical terms follows.

The term “Anatolia” (the Turkish “Anadolu”, also called “Asia Minor”) refers to the Asiatic peninsula of Turkey. The “Near East” includes all the lands around the south-eastern shores of the Mediterranean Sea, such as the easternmost areas of North Africa, south-western Asia, and the eastern Balkan Peninsula. The “Middle East” covers the lands around the southern and eastern coasts of the Mediterranean Sea, reaching the Sind, through the Arabian Peninsula, Iraq, Iran, Afghanistan and Pakistan. The term “Levant” is the most confusing of all the terms used in this paper and often is synonym of “Near East”. According to the meaning prevailing after the First World War it is here used in a narrower sense as the coastal area extending through Latakia, Lebanon and Israel. The term “Kolkhida” (from the ancient kingdom of Colchis) is applied to the coastal lowlands of the eastern Black Sea in Georgia. The term “Pontic” was used for the region of the northern Anatolian chains. The term “Palearctic” was preferred to “Palaeartic” (both used by English and American biogeographers) in order to simplify the spelling.

The numerical (3-digits) and letter (3-letters) codes of chorotypes more or less widely extended in the W-Palearctic subregion follow those introduced by Vigna Taglianti et al. (1993), with a few additions and improvements, discussed below (Tab. I).

A numerical (4-digits) and letter (4-letters) coding system of recurrent patterns of the endemic taxa was also tested and applied to the Near East fauna (Tab. II). As to the Greek areas, we accepted, with some changes, the regional districts proposed by Schmalzfuss (1979), Carpaneto (1985), Bologna (1986) and Audisio et al. (1996). As letter codes we used simple and partly self-explaining acronyms, while numerical codes were defined using the international phone country-codes (followed by 0, 00 or 000 if necessary to complete the 4 digits). The numerical codes were chosen on the basis of the “reference country” of each identified chorotype (*i.e.*, the country most widely included in the recognised recurrent pattern) and was combined with a 2-digits code referring to a regional (Near East) list of endemic patterns (Tab. II). A revised and updated classification for the Italian endemics and subendemics (*cf.* Audisio et al., 1995) is also included (Appendix I).

RESULTS

a. The main chorotypes of the Western Palearctic fauna, with special reference to the Near East (Figs 1-34)

Five major groups of chorotypes emerged from this study, as defined by a former classification scheme (Vigna Taglianti et al., 1993): (1) species widely spread in the Holarctic Region; (2) species more or less widely spread in Europe; (3) species more or less widely spread in the Mediterranean countries, (4) species

widely spread in the Palearctic and extending to Mediterranean countries; (5) species widely spread in the Palearctic Region but occurring in a very small area of the Western Palearctic region.

Distribution patterns of species with disjunct ranges should be referred to the chorotypes which cover all their areas of occurrence or their main area of distribution. For example, the amphimediterranean species (*i.e.*, species occurring on the opposite sides of the Mediterranean but lacking in the central part) should be referred to the Mediterranean chorotype.

1. Chorotypes of species widely spread in the Holarctic Region

1.01. **Holarctic.** Chorotype of species widespread either in Palearctic or Nearctic Regions. The indigenous occurrence of the species in both these regions must be ascertained.

1.02. **Palearctic.** Chorotype of species widespread in the Palearctic Region: Eurasia, south to the Himalayan chain, Africa north of Sahara and Macaronesia.

1.03. **W-Palearctic.** Chorotype of species widespread from Europe to the Ural Mountains and SW Asia, south to N Africa and west to Macaronesia.

1.04. **Asiatic-European.** Chorotype of species widespread through the Eurasian continent, south to the Himalayan chain.

1.05. **Sibero-European.** Chorotype of species widespread in Siberia and extending westwards to Europe, sometimes occurring in mountainous areas of western Asia. Some species of this group show a reduced distribution range (species occurring in Siberia and N Europe, and the “boreo-alpine” species).

1.06. **Centralasiatic-European-Mediterranean.** Chorotype of species widespread from the Gobi desert to the Aralo-Caspian Depression, Middle East, Caucasus, Anatolia, Europe (mainly in southern and central countries), N Africa.

1.07. **Centralasiatic-European.** As 1.06, but excluding N Africa.

1.08. **Centralasiatic-Mediterranean.** As 1.06 but excluding Central Europe.

1.09. **Turano-European-Mediterranean.** Chorotype of species widespread in Europe (mainly in southern and central countries), N Africa, Middle East, Anatolia, Caucasus, Iran and W Turkestan.

1.10. **Turano-European.** As 1.09, but excluding N Africa. The species named “Turano-Sarmato-Pannonian” and “Ponto-Pannonian” in literature should also be referred to this chorotype.

1.11. **Turano-Mediterranean.** As 1.09, but excluding central Europe. This chorotype also includes the following detailed distribution patterns: Turano-Balkan, Irano-Mediterranean, Turano-E-Mediterranean, Turano-Appenninian, Turano-Anatolian, Balkano-Anatolian.

1.12. **European-Mediterranean.** Chorotype of species widespread in central and southern Europe and Mediterranean countries.

1.13. **SW-Asiatic.** Chorotype of species widespread in Middle East countries. This pattern includes the areas from eastern Mediterranean coastal regions (from Anatolia to Sinai) east to the Sind (Indo River basin), through the Arabian Peninsula, Mesopotamia and Iran, north to Caucasus and SW Turkmenistan (both included). This chorotype also includes the following detailed distribution patterns: Anatolo-Caucasian, Iranian, Irano-Anatolian, Irano-Caucasian, Irano-Palaestianian, Mesopotamian, Sindo-Mesopotamian, Syro-Anatolian, Syro-Anatolo-N-African. This chorotype was not considered by Vigna Taglianti et al. (1993).

2. *Chorotypes of species more or less widely spread in Europe*

2.01. **European.** Chorotype of species widespread in Europe, with possible extension to Anatolia, Caucasus, Maghreb and Macaronesia.

2.02. **N-European.** Chorotype of species occurring in N Europe, approximately from Jutland to the Ural Mountains. This chorotype is not represented in the Near East fauna.

2.03. **Centraleuropean.** Chorotype of species widespread in Central Europe, from southern Scandinavia south to the Po River basin, and from the Rhin River basin east to Ukraina (Sarmatian plain and the Don River basin). Extensions are possible to S Europe, the British Isles and N Caucasus.

2.04. **S-European.** Chorotype of species more or less widespread in S Europe, north to the Loire River basin, the Alps and the Carpathian Mountains. Extensions are possible like those of 2.03.

2.05. **W-European.** Chorotype of species occurring in the western part of Europe, approximately from Scandinavia to the Iberian Peninsula (including the British Isles), east to the Rhin and Rhône River basins, south to the Tagus River basin. This chorotype is not represented in the Near East fauna.

2.06. **E-European.** Chorotype of species distributed in the Sarmatian plain, approximately ranging west to the Vistula River basin and the Carpathian Mountains, east to the Ural Mountains.

3. *Chorotypes of species more or less widely spread in the Mediterranean countries*

3.01. **Mediterranean.** Chorotype of species widespread in Mediterranean countries. Some extensions occur west to Macaronesia and to the Atlantic coasts of Europe, south to Sahara, and east to Iran. This chorotype also includes the Anatolo-Balkano-N-African detailed distribution pattern.

3.02. **W-Mediterranean.** Chorotype of species occurring in the western countries of the Mediterranean basin, west of the Italian peninsula and the Gulf of Sirte. Some extensions occur west to the Atlantic coasts of Europe and south to Sahara. This chorotype is very rarely represented in the Near East fauna.

3.03. **E-Mediterranean.** Chorotype of species occurring in the eastern countries of the Mediterranean basin, east of the Italian peninsula and the Gulf of Sirte, east to the Black Sea. Some extensions occur east to Iran and the Middle East, southwest to Sahara. This chorotype also includes the following detailed distribution patterns: NE-Mediterranean, Palaestino-Cyprioto-Taurian, Palaestino-Taurian, Aegean.

3.04. **N-African.** Chorotype of species distributed in N Africa (north of Sahara), with some extensions to neighbouring areas. This chorotype is moderately represented in the Near East fauna.

3.05. **Mediterraneo-Sindian.** Chorotype of species widespread in Mediterranean countries and ranging east to the Sind. Usually, the range does not include the inner part of the Arabian desert, and extends eastwards along the Arabian and Iranian coastline. This chorotype was not considered by Vigna Taglianti et al. (1993).

4. Chorotypes of species widely spread in the Paleotropics and extending to Mediterranean countries

4.01. **Afrotropico-Indo-Mediterranean.** Chorotype of species widespread in the Afrotropical and the Indo-Malayan regions, also occurring in Mediterranean countries.

4.02. **Afrotropico-Mediterranean.** Chorotype of species widespread in the Afrotropical Region, also occurring in Mediterranean countries.

4.03. **Indo-Mediterranean.** Chorotype of species widespread in the Indo-Malayan Region, also occurring in Mediterranean countries.

5. Chorotypes of species widely spread in the Palearctic Region but occurring in small peripheral areas of the Western Palearctic region

5.01. **Asiatic.** Chorotype of species widespread in Asia, south to the Himalayan chain, west to the Ural Mountains and Turkestan.

5.02. **Siberian.** Chorotype of species widespread in Siberia, westwards to the Ural Mountains.

5.03. **Centralasiatic.** Chorotype of species widespread in Central Asia, from the Gobi desert to the Aralo-Caspian Depression.

5.04. **Saharo-Sindian.** Chorotype of species widespread from Mauritania to the Sind, through the Saharo-Arabian desert areas.

5.05. **Saharian.** Chorotype of species spread through the Sahara, from the Atlantic coast to the Red Sea.

5.06. **Arabian.** Chorotype of species occurring in the Arabian Peninsula, from the Red Sea to the Persian Gulf.

5.07. **Turanian**. Chorotype of species occurring from the Aralo-Caspian Depression to the Caucasian region, sometimes extending westwards to the Syrian Desert. This chorotype also includes the Turano-Caucasian, Turano-Syrian and Ponto-Caspian detailed distribution patterns. This chorotype was not considered by Vigna Taglianti et al. (1993).

5.08. **Saharo-Sahelo-Arabian** (*). Chorotype of species widely spread through the Sahara and Sahel regions, eastwards to the Arabian Peninsula. This chorotype was not considered by Vigna Taglianti et al. (1993).

5.09. **Saharo-Sahelo-Sindian** (*). Chorotype of species widely spread through the Sahara and Sahel regions, eastwards to the Sind. This chorotype was not considered by Vigna Taglianti et al. (1993).

5.10. **Saharo-Turano-Sindian** (*). Chorotype of species widely spread from Sahara, northeast to the Aralo-Caspian Depression, eastwards to the Sind. This chorotype was not considered by Vigna Taglianti et al. (1993).

5.11. **NE-African-Sindian**. Chorotype of species occurring in NE Africa (Nile valley and coastal zone of Egypt, Sudan, Ethiopia, Somalia and neighbouring countries), Arabian Peninsula and southern Iran, eastwards to the Sind (cf. Carpaneto and Piattella, 1990). Some extensions may occur northwards to SE Anatolia and Turkmenistan. This chorotype was not considered by Vigna Taglianti et al. (1993).

b. *Cosmopolitan and subcosmopolitan species*

These categories include species occurring in all the zoogeographical regions (cosmopolitan) or more than three zoogeographical regions (subcosmopolitan).

c. *Endemics to the Near East*

In this group we included the species that are endemic to more or less extended areas of the Near East, but that globally could be referred to the above listed main chorotypes according to their assumed phylogenetical relationships.

These species occur in restricted areas within Anatolia and the Levant or in other small areas of the Near East, as defined in the "Materials and methods" section. Most of the endemic taxa occurring in the Near East appear to have more or less restricted distribution patterns as shown in Tab. II. These distribution patterns are mostly referable to the SW-Asiatic, E-Mediterranean, and Turanian chorotypes.

Since we set two series of codes (both numerical and letter) to be applied to the distribution of widespread and endemic species respectively, it is now possible to connect each of the distribution patterns recognised for the endemic taxa

(*) The species referred to chorotypes 5.08, 5.09 and 5.10 often do not occur in Maghreb.

(Tab. II) with one of the above tabulated “main chorotypes” (Tab. I). For instance, a species endemic to the Central Anatolia (9000.07 and ANAC) with clear Turanian (5.07 and TUR) affinities (Tabs. II and I) should be identified as: 5.07.9000.07 = TUR.ANAC.

Tab. I - Main chorotypes of the Western Palearctic region and their codes.

Numerical code	Letter code	Chorotype name
0.01	COS	Cosmopolitan
0.02	SCO	Subcosmopolitan
1.01	OLA	Holarctic
1.02	PAL	Palearctic
1.03	WPA	W-Palearctic
1.04	ASE	Asiatic-European
1.05	SIE	Sibero-European
1.06	CEM	Centralasiatic-European-Mediterranean
1.07	CAE	Centralasiatic-European
1.08	CAM	Centralasiatic-Mediterranean
1.09	TEM	Turano-European-Mediterranean
1.10	TUE	Turano-European
1.11	TUM	Turano-Mediterranean
1.12	EUM	European-Mediterranean
1.13	SWA**	SW-Asiatic
2.01	EUR	European
2.02	NEU*	N-European
2.03	CEU	Centraleuropean
2.04	SEU	S-European
2.05	WEU*	W-European
2.06	EEU	E-European
3.01	MED	Mediterranean
3.02	WME*	W-Mediterranean
3.03	EME	E-Mediterranean
3.04	NAF	N-African
3.05	MES**	Mediterraneo-Sindian
4.01	AIM	Afrotropico-Indo-Mediterranean
4.02	AFM	Afrotropico-Mediterranean
4.03	INM	Indo-Mediterranean
5.01	ASI	Asiatic
5.02	SIB	Siberian
5.03	CAS	Centralasiatic
5.04	SAS	Saharo-Sindian
5.05	SAH*	Saharian
5.06	ARA*	Arabian
5.07	TUR**	Turanian
5.08	SSA**	Saharo-Sahelo-Arabian
5.09	SSS**	Saharo-Sahelo-Sindian
5.10	STS**	Saharo-Turano-Sindian
5.11	NAS**	NE-African-Sindian

Note: * = chorotype not quoted for Anatolia until now; ** = chorotype not proposed by Vigna Taglianti et al. (1993).

Tab. II - Recurrent patterns of taxa endemic to Anatolia and neighbouring areas, and their codes.

Numerical code	Letter code	Chorotype name	Reference country
9000.01	ANAT	Anatolian endemic	Turkey
9000.02	ANAN	N-Anatolian (= Pontic) endemic	Turkey
9000.03	ANAW	W-Anatolian endemic	Turkey
9000.04	ANNW	NW-Anatolian endemic	Turkey
9000.05	ANNE	NE-Anatolian endemic	Turkey
9000.06	POCA	Ponto-Caucasian endemic	Turkey
9000.07	ANSW	SW-Anatolian endemic	Turkey
9000.08	ANAS	S-Anatolian (= Taurian) endemic	Turkey
9000.09	ANAC	Central Anatolian endemic	Turkey
9000.10	KURD	Kurdish endemic	Turkey
3740.01	CAUC	Caucasian endemic	Armenia
3740.02	ARME	Armenian endemic	Armenia
3740.03	ARAN	Armeno-E-Anatolian endemic	Armenia
3740.04	ARCA	Armeno-Caucasian endemic	Armenia
9800.01	IRAW	W-Iranian endemic	Iran
9800.02	IRNO	W-Iranian endemic	Iran
9800.03	IRCA	N-Irano-Caucasian endemic	Iran
9640.01	MESN	N-Mesopotamian endemic	Iraq
9950.01	KOLK	Kolkhidian endemic	Georgia
9950.02	KOAR	Kolkhido-Armenian endemic	Georgia
9950.03	KOCA	Kolkhido-Caucasian endemic	Georgia
9620.01	SYPA	Syro-Palaestinian endemic	Jordan
3570.01	CYPR	Cypriot endemic	Cyprus
3000.01	GRNW	NW-Greek endemic	Greece
3000.02	MACE	Macedonian endemic	Greece
3000.03	THRA	Thracian endemic	Greece
3000.04	PELO	Peloponnesian endemic	Greece
3000.05	THES	Thessalian endemic	Greece
3000.06	ATTI	Attican endemic	Greece
3000.07	CRET	Cretean endemic	Greece

Appendix I - Recurrent patterns of taxa endemic or subendemic to geographic Italy, and their codes.

Numerical code	Letter code	Chorotype name
3900.01	ITAL	Italian endemic
3900.02	ALPS	S-Alpine endemic
3900.03	ALPC	Central-S-Alpine endemic
3900.04	ALPW	W-Alpine endemic
3900.05	ALSW	SW-Alpine endemic
3900.06	ALPE	E-Alpine endemic
3900.07	ALSE	SE-Alpine (Carso-Istrian) endemic
3900.08	CADI	Carso-Istrian-Dinaric endemic
3900.09	PADA	Padanian endemic
3900.10	ALAP	Alpino-Apenninic endemic
3900.11	ALWA	W-Alpino-Apenninic endemic
3900.12	AWNA	W-Alpino-N-Apenninic endemic
3900.13	APPE	Apenninic endemic
3900.14	APPN	N-Apenninic endemic
3900.15	APPC	Central-Apenninic endemic
3900.16	APPS	S-Apenninic endemic
3900.17	APDI	Apennino-Dinaric endemic
3900.18	TYRR	Tyrrhenian endemic
3900.19	SACO	Sardo-Corsican endemic
3900.20	SARD	Sardinian endemic
3900.21	SICI	Sicilian endemic
3900.22	SISC	Sicilo-S-Calabrian endemic
3300.01	CORS	Corsican endemic

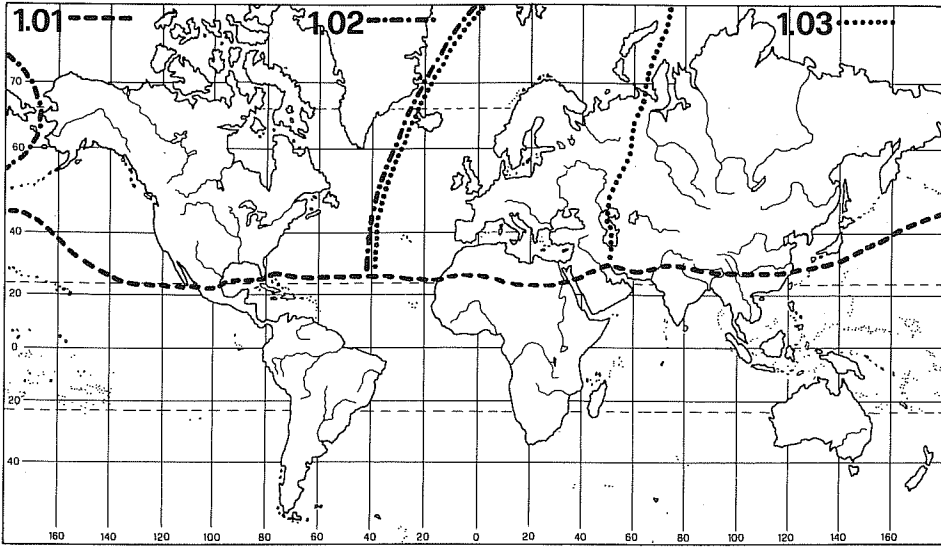


Fig. 1 - Holarctic (1.01 OLA), Palearctic (1.02 PAL) and W-Palearctic (1.03 WPA) chorotypes.

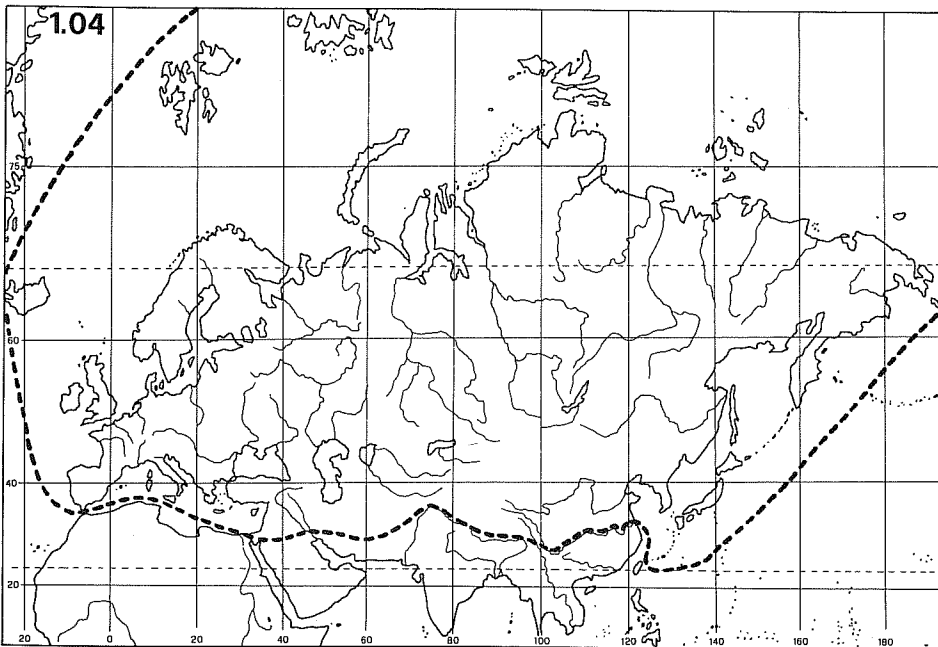


Fig. 2 - Asiatic-European chorotype (1.04 ASE).

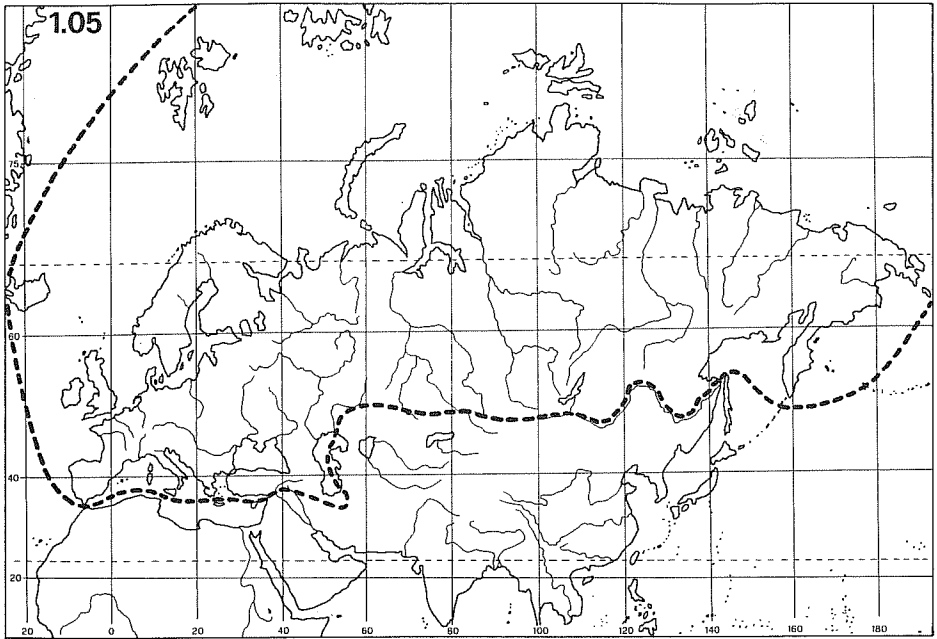


Fig. 3 - Sibero-European chorotype (1.05 SIE).

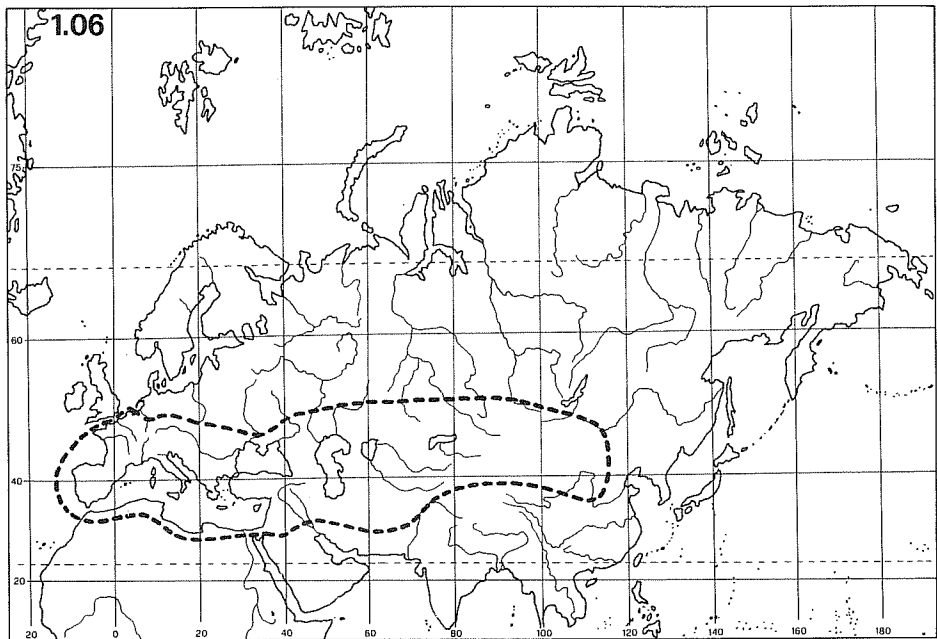


Fig. 4 - Centralasiatic-Europeo-Mediterranean chorotype (1.06 CEM).

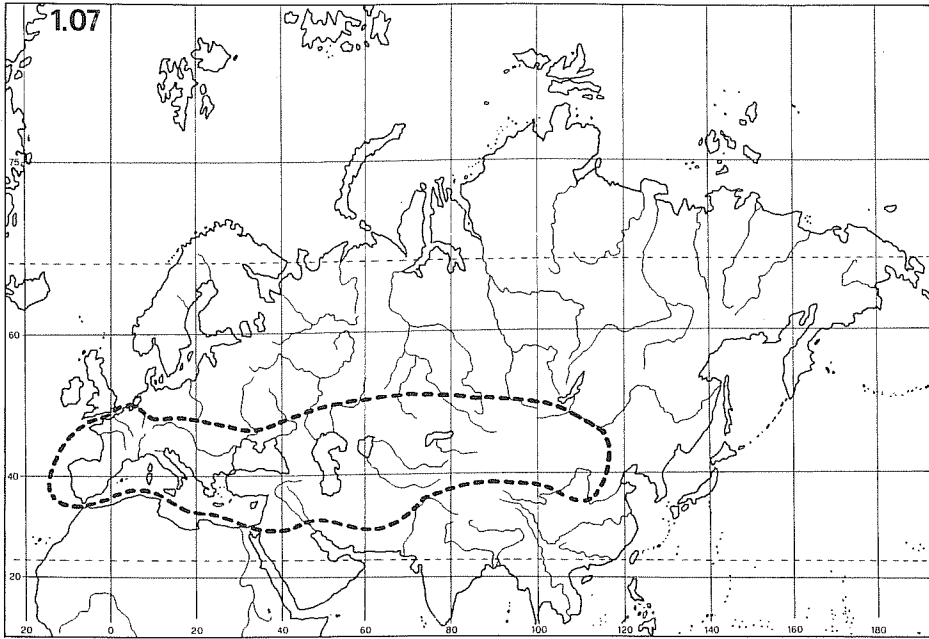


Fig. 5 - Centralasiatic-European chorotype (1.07 CAE).

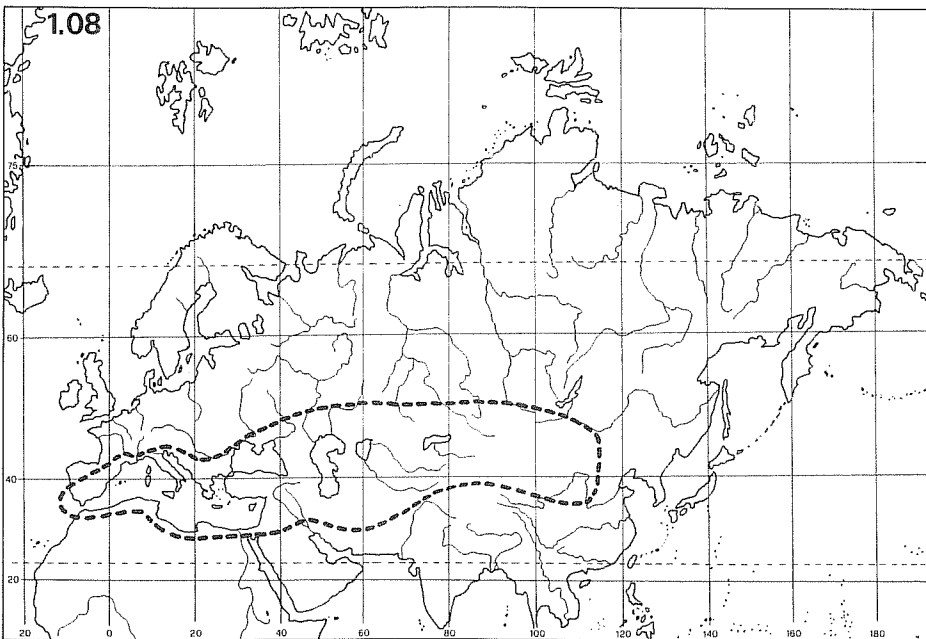


Fig. 6 - Centralasiatic-Mediterranean chorotype (1.08 CAM).

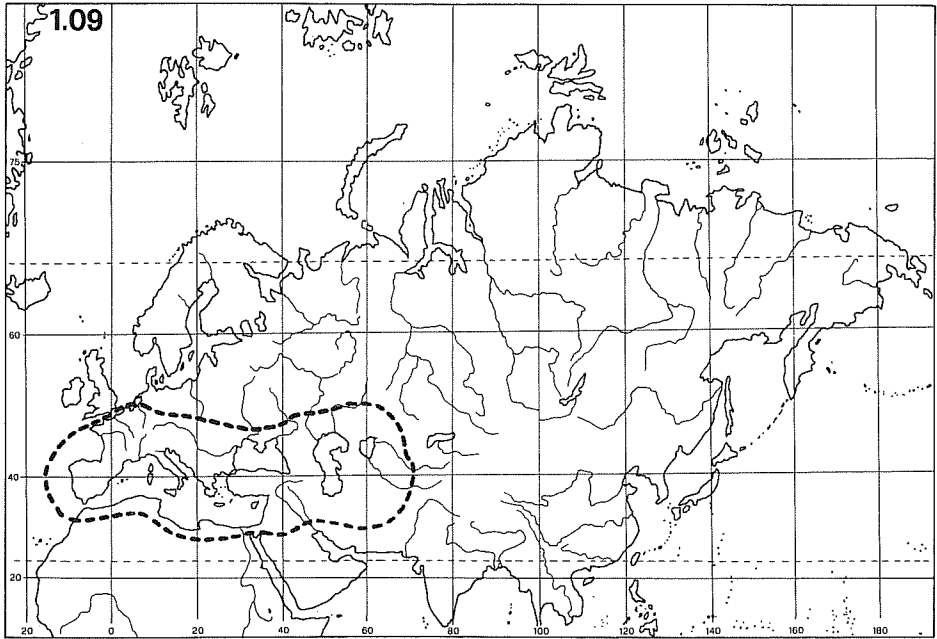


Fig. 7 - Turano-European-Mediterranean chorotype (1.09 TEM).

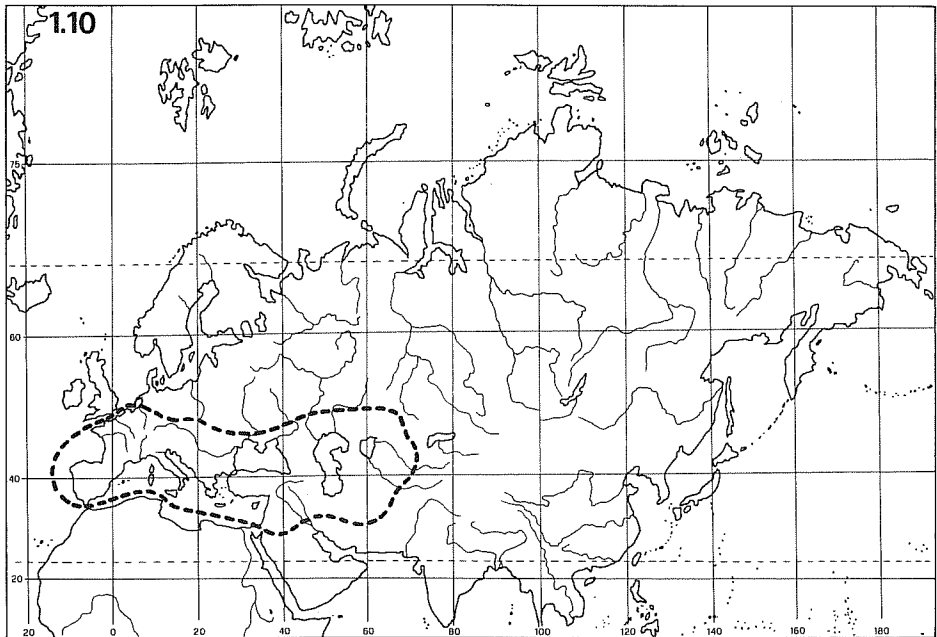


Fig. 8 - Turano-European chorotype (1.10 TUE).

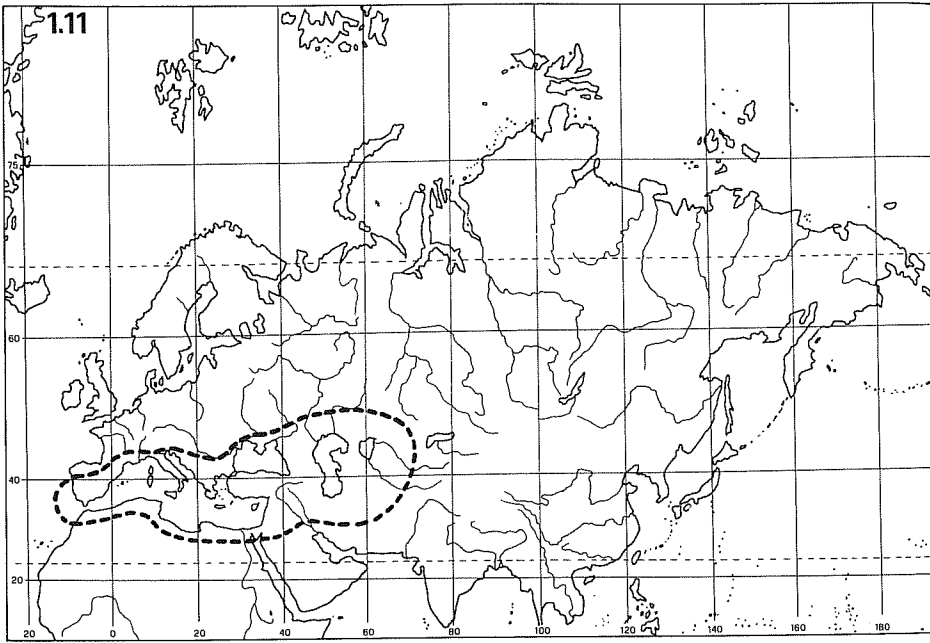


Fig. 9 - Turano-Mediterranean chorotype (1.11 TUM).

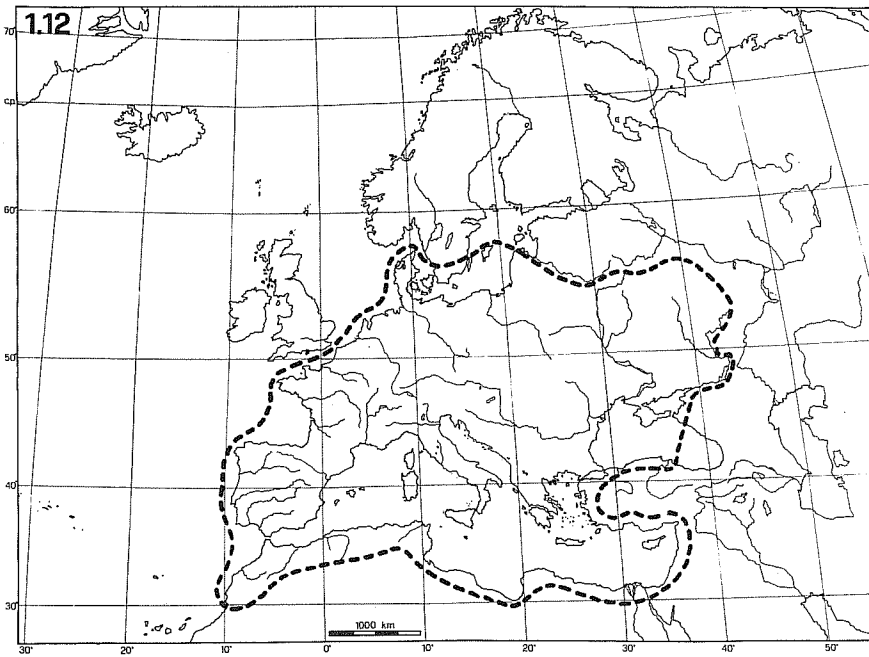


Fig. 10 - Europeo-Mediterranean chorotype (1.12 EUM).

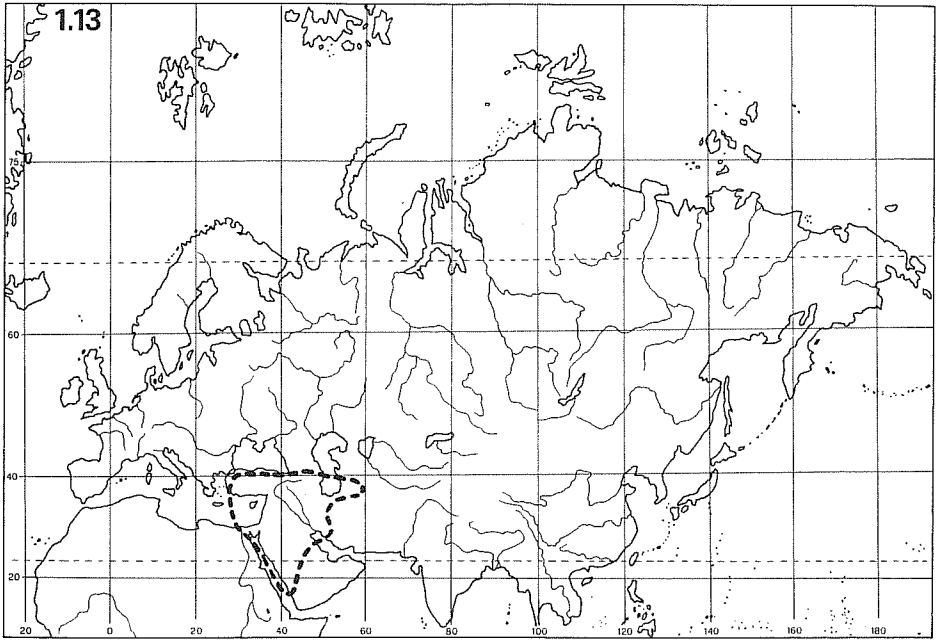


Fig. 11 - SW-Asiatic chorotype (1.13 SWA).

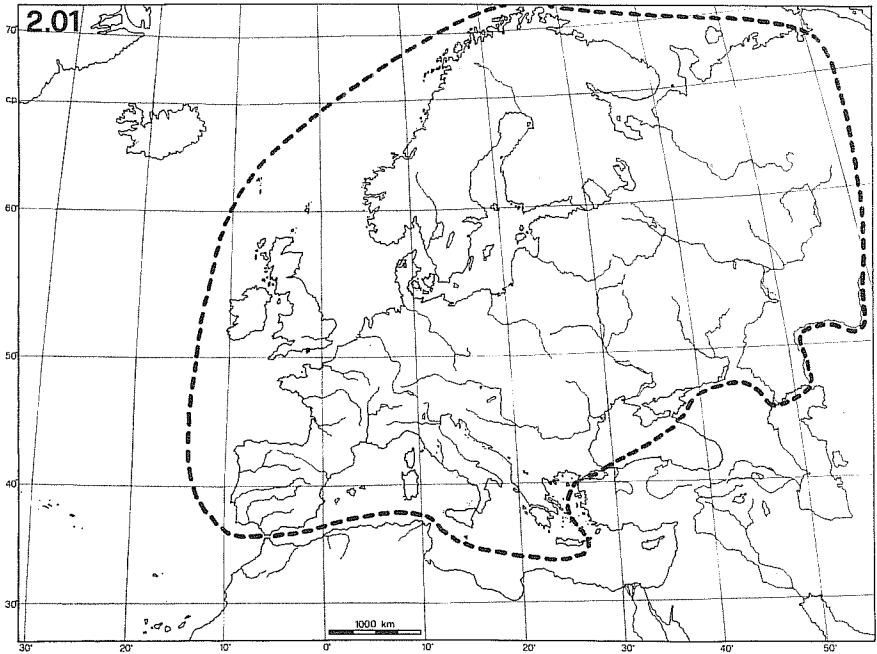


Fig. 12 - European chorotype (2.01 EUR).

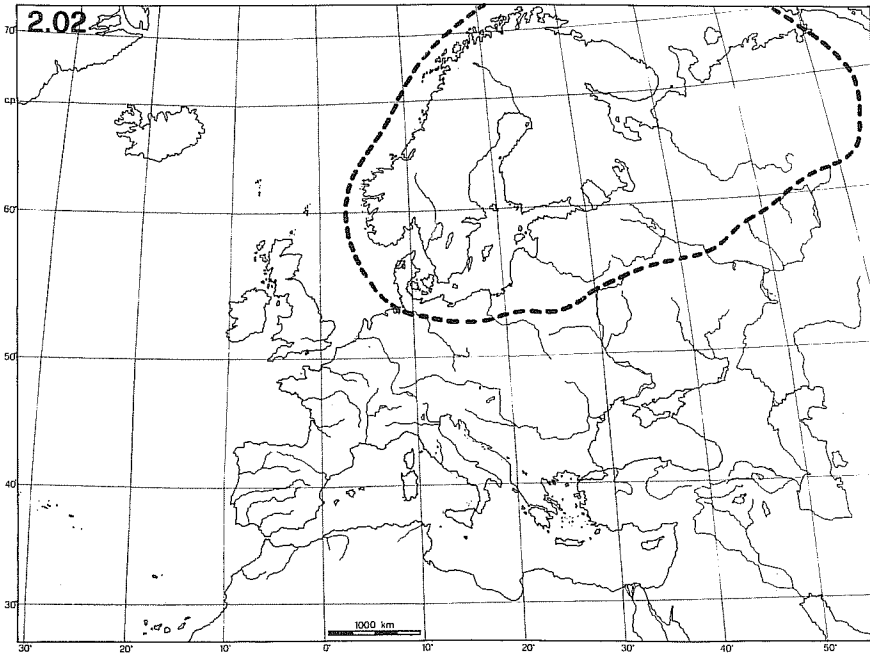


Fig. 13 - N-European chorotype (2.02 NEU).

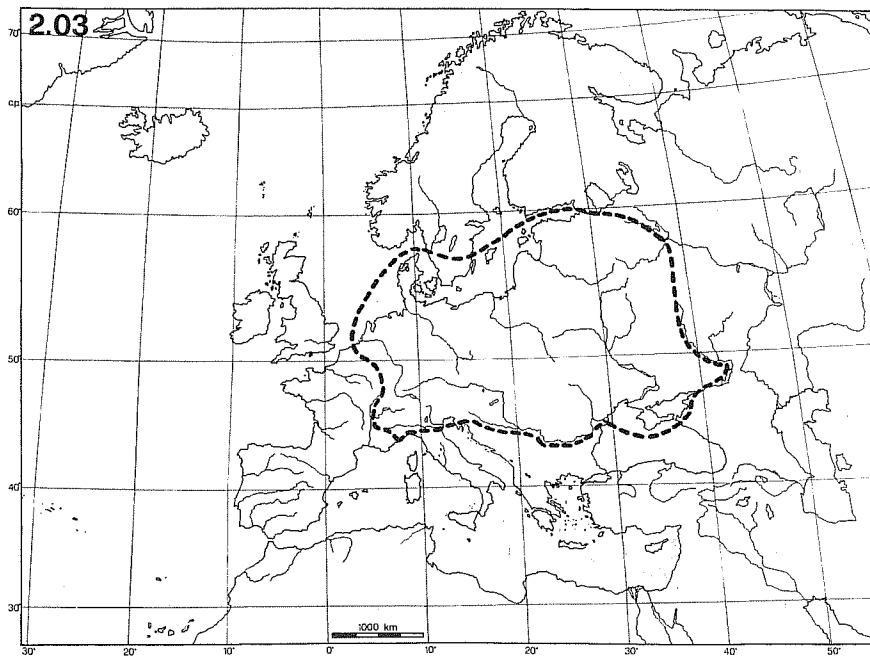


Fig. 14 - Centraleuropean chorotype (2.03 CEU).

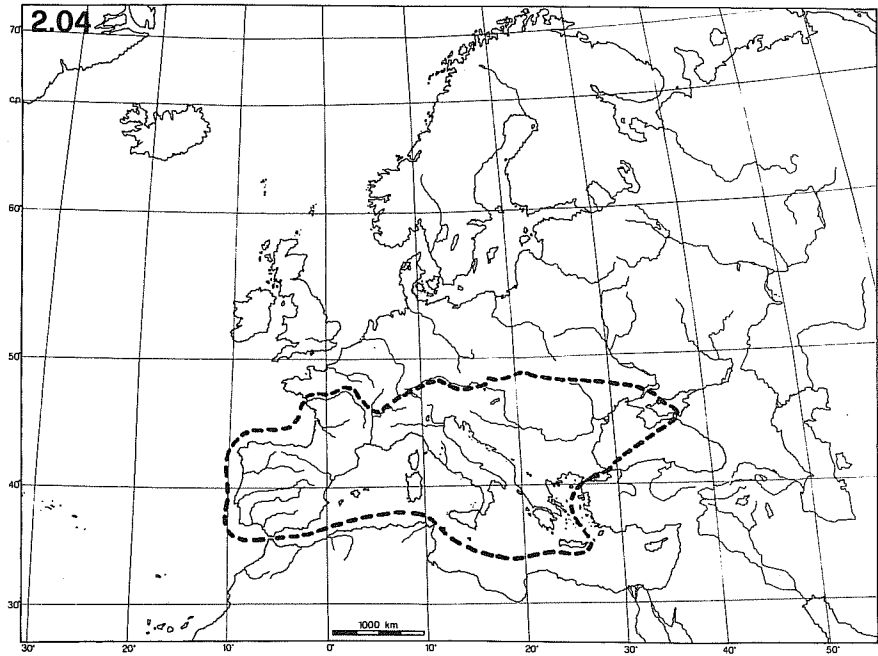


Fig. 15 - S-European chorotype (2.04 SEU).

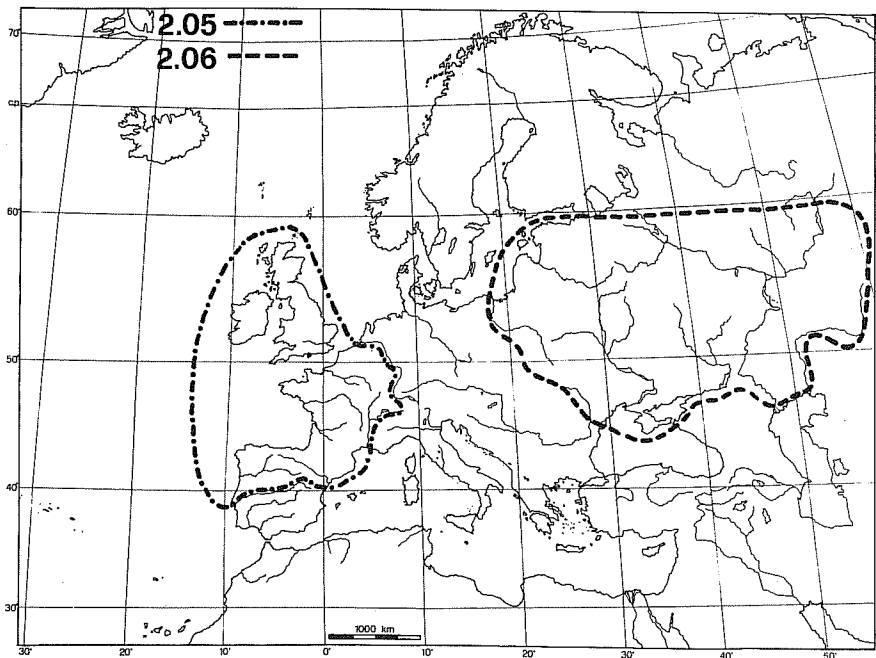


Fig. 16 - W-European (2.05 WEU) and E-European (2.06 EEU) chorotypes.

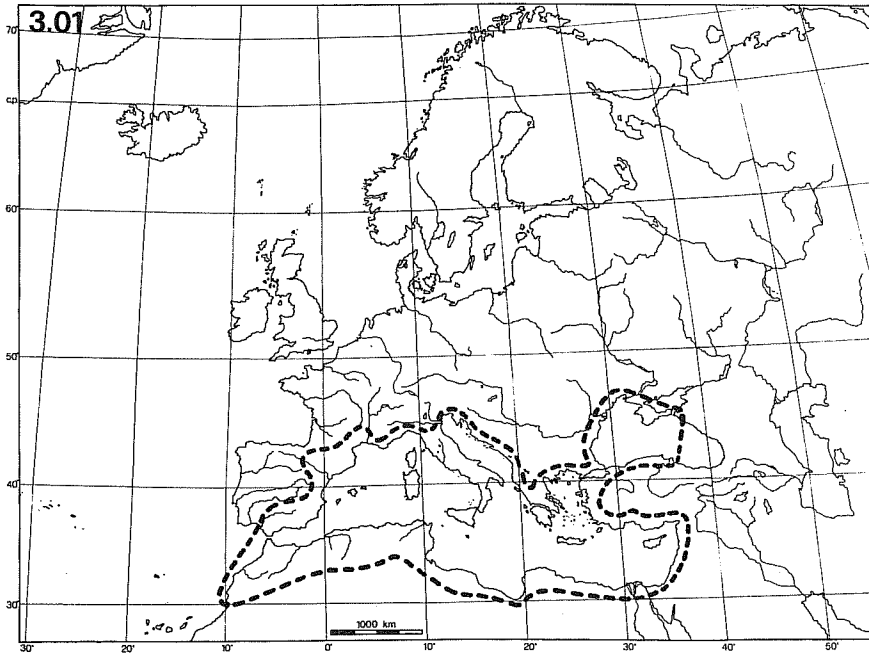


Fig. 17 - Mediterranean chorotype (3.01 MED).

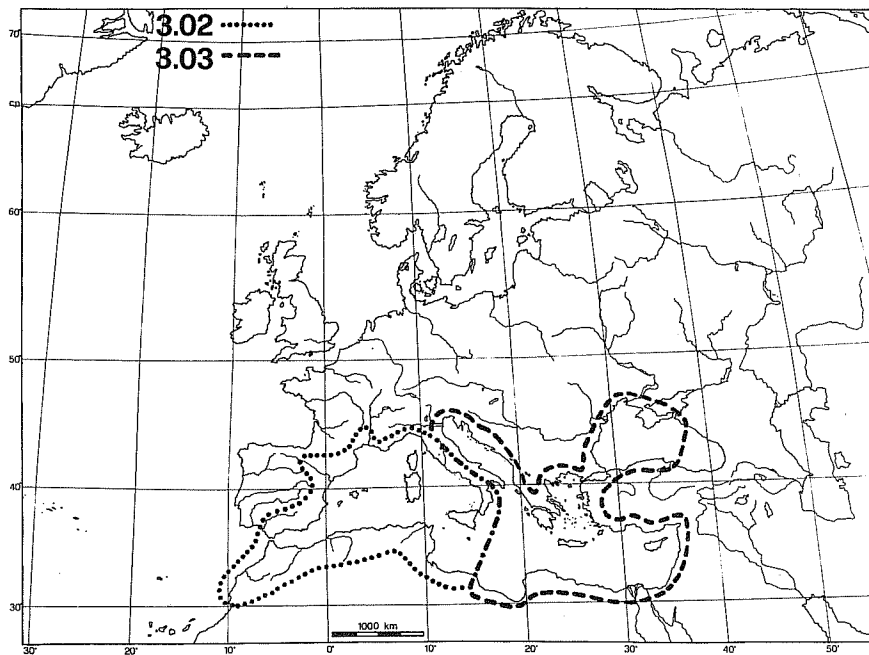


Fig. 18 - W-Mediterranean (3.02 WME) and E-Mediterranean (3.03 EME) chorotypes.

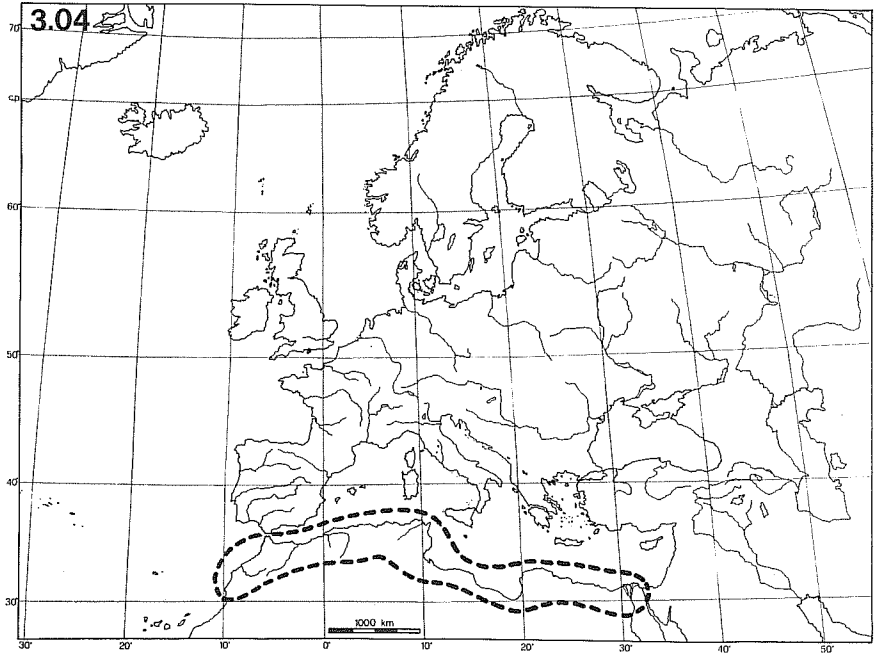


Fig. 19 - N-African chorotype (3.04 NAF).

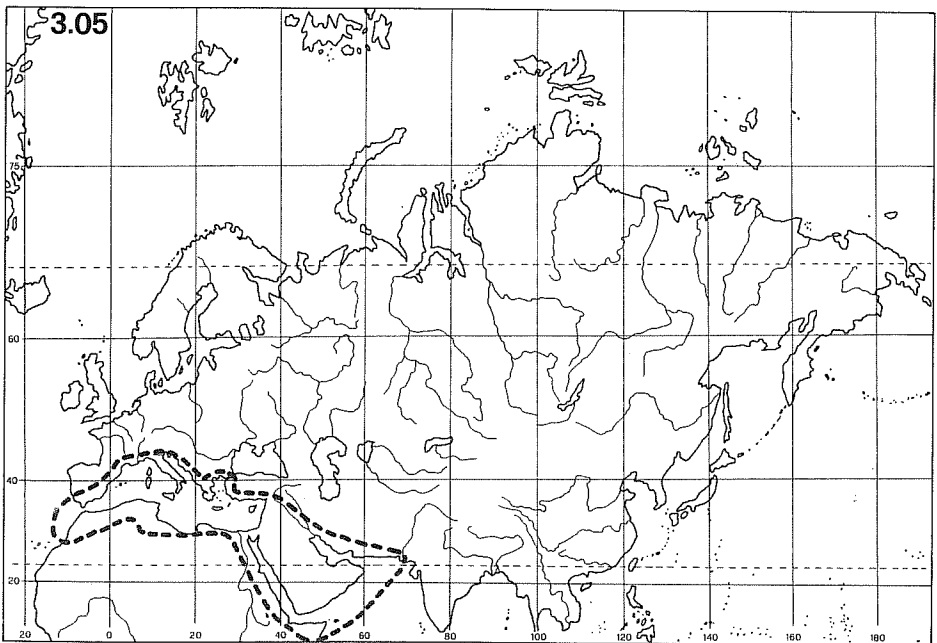


Fig. 20 - Mediterraneo-Sindian chorotype (3.05 MES).

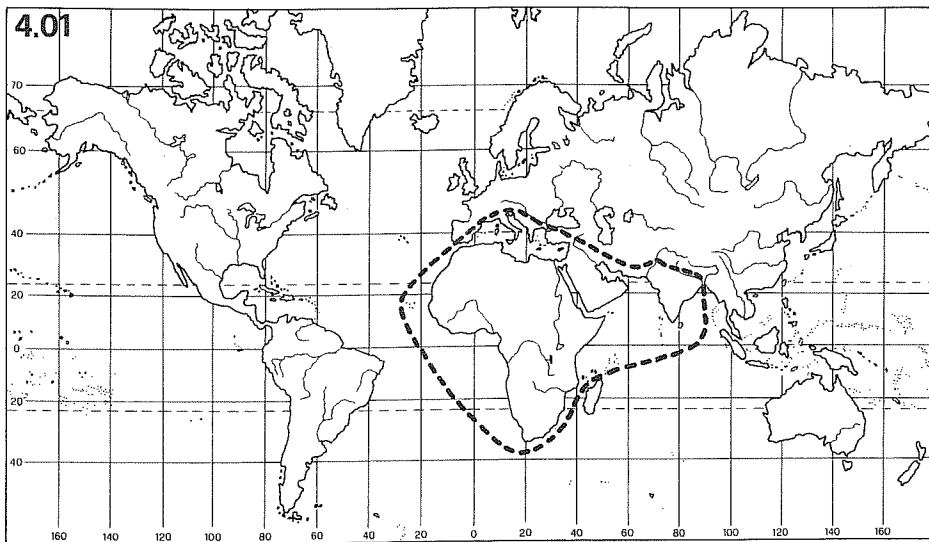


Fig. 21 - Afrotropico-Indo-Mediterranean chorotype (4.01 AIM).

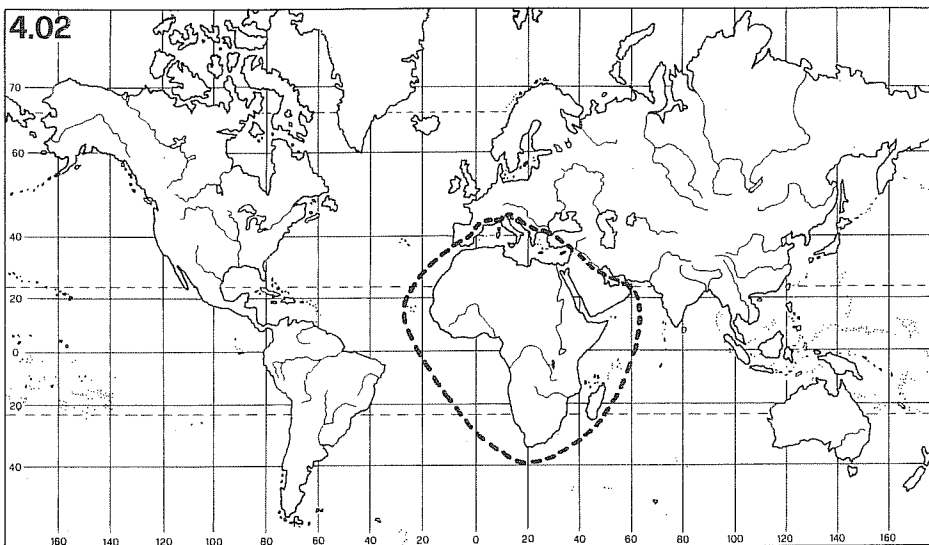


Fig. 22 - Afrotropico-Mediterranean (4.02 AFM).

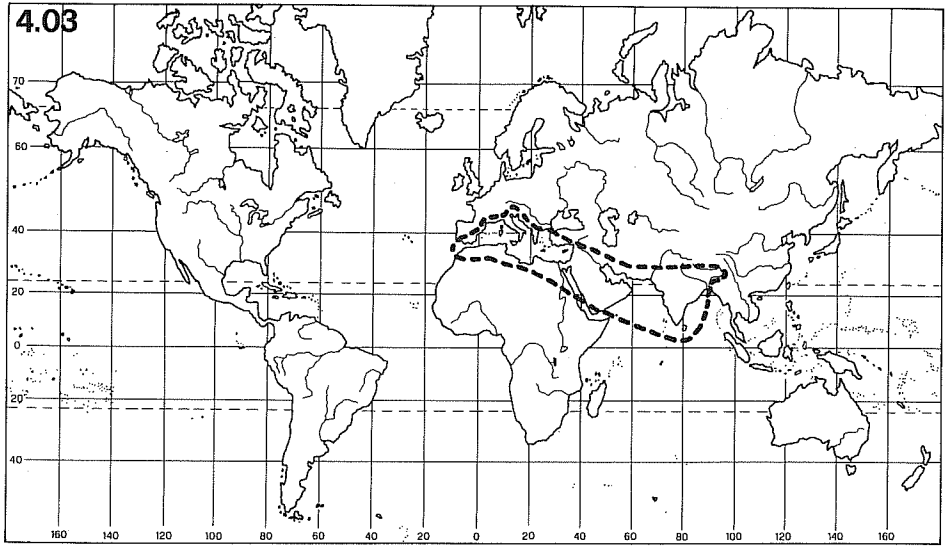


Fig. 23 - Indo-Mediterranean chorotype (4.03 INM).

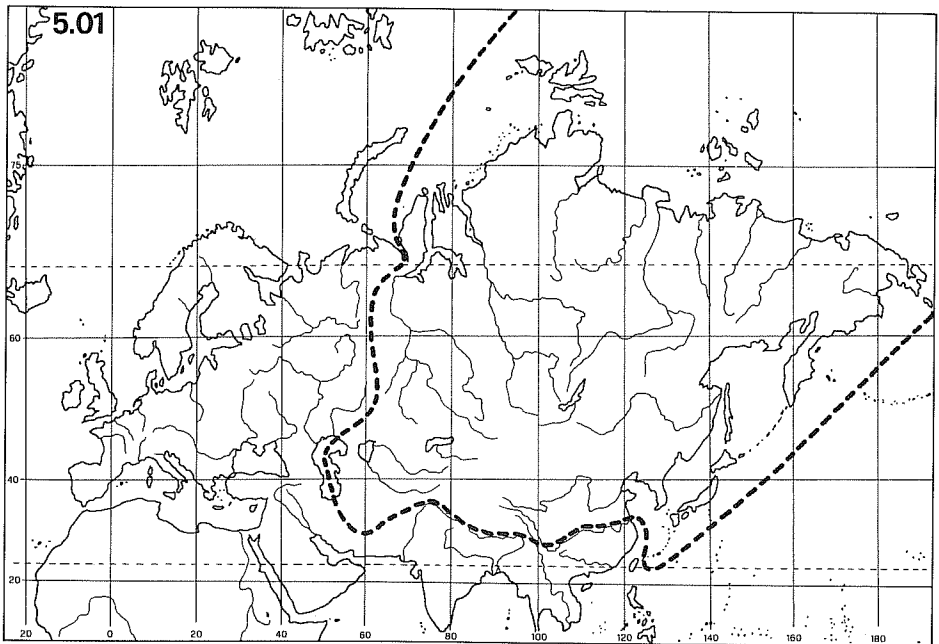


Fig. 24 - Asiatic chorotype (5.01 ASI).

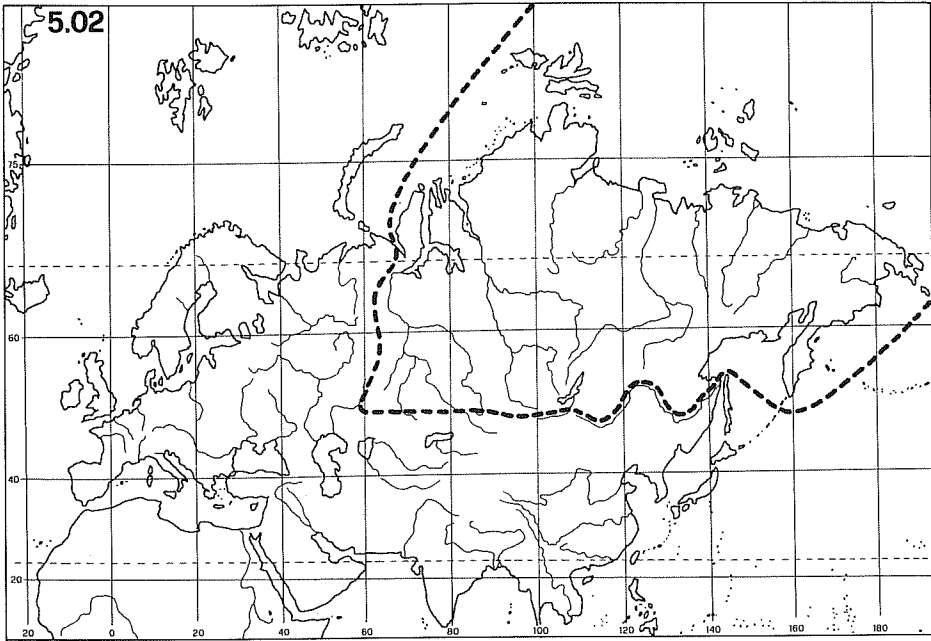


Fig. 25 - Siberian chorotype (5.02 SIB).

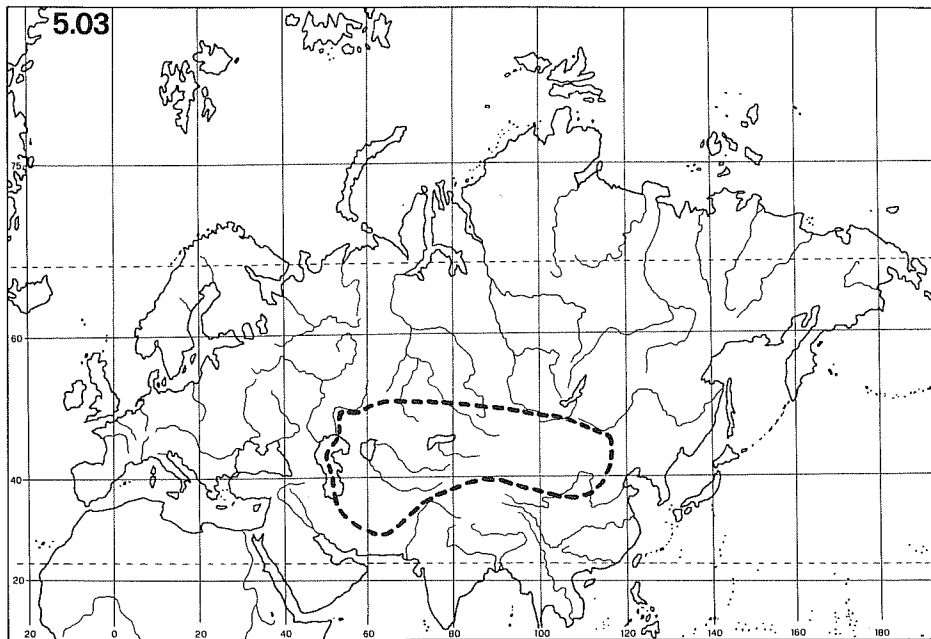


Fig. 26 - Centralasiatic chorotype (5.03 CAS).

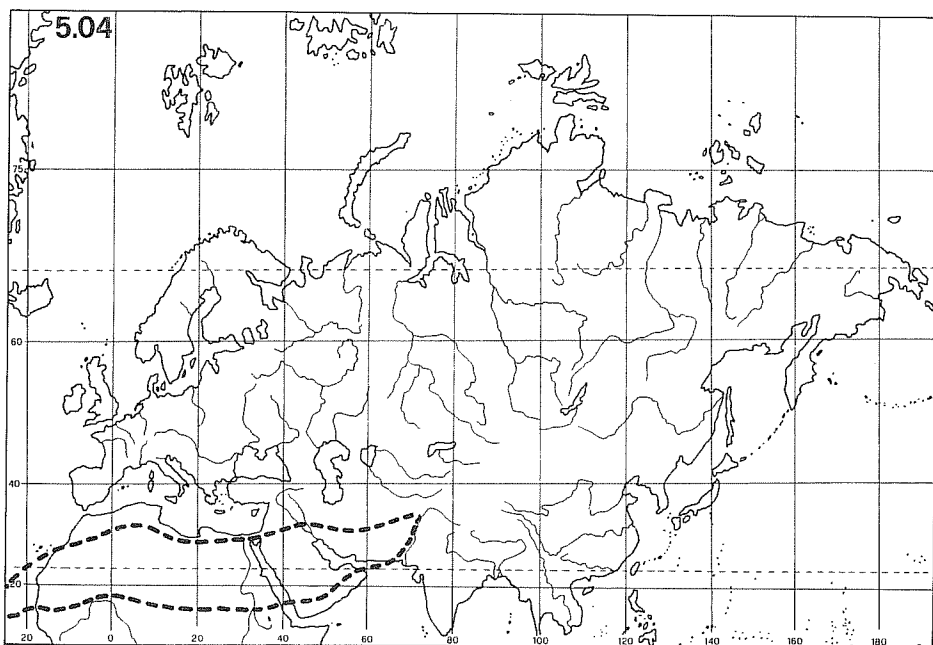


Fig. 27 - Saharo-Sindian chorotype (5.04 SAS).

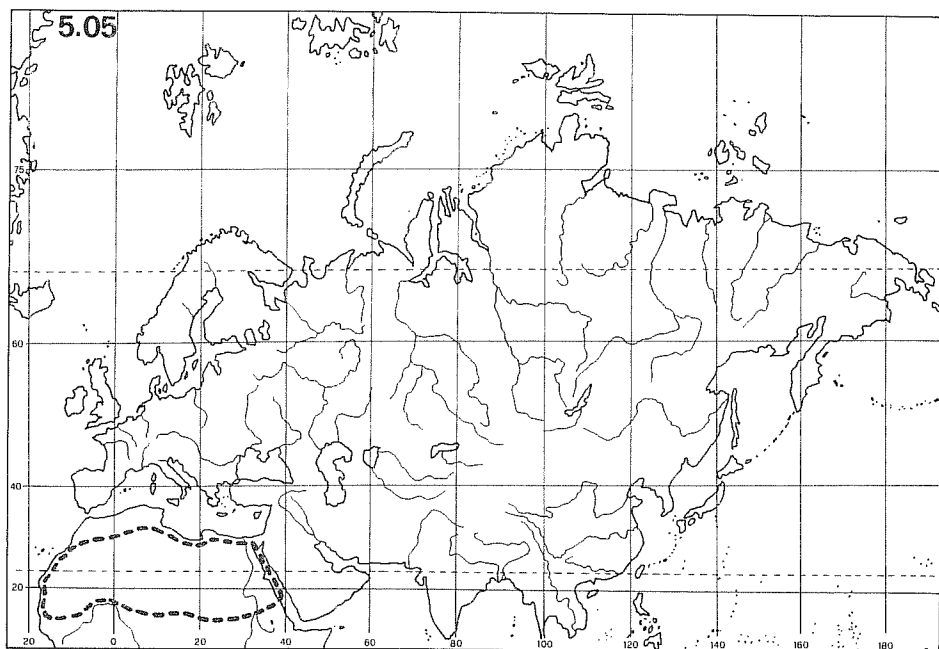


Fig. 28 - Saharian chorotype (5.05 SAH).

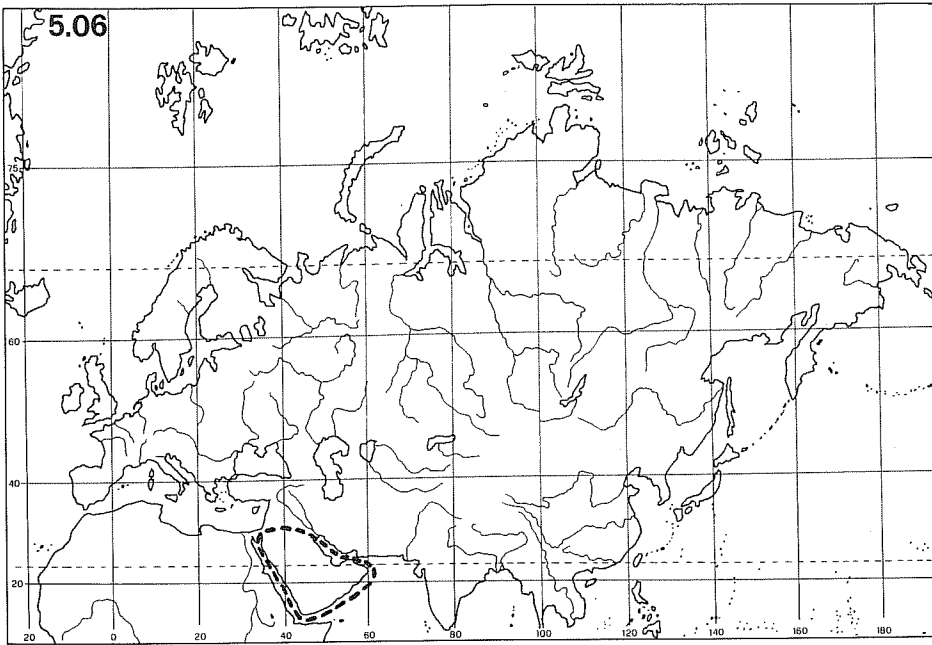


Fig. 29 - Arabian chorotype (5.06 ARA).

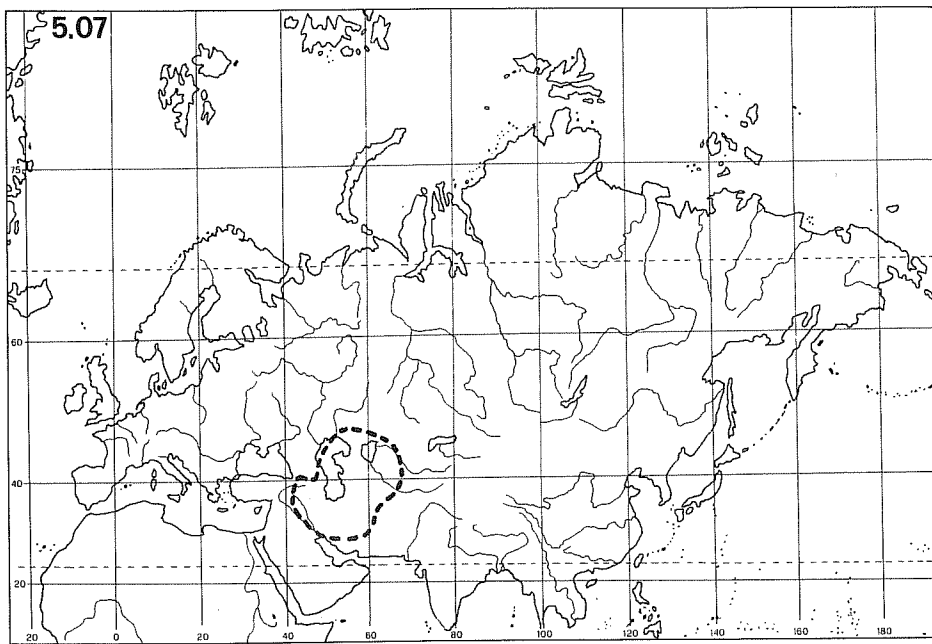


Fig. 30 - Turanian chorotype (5.07 TUR).

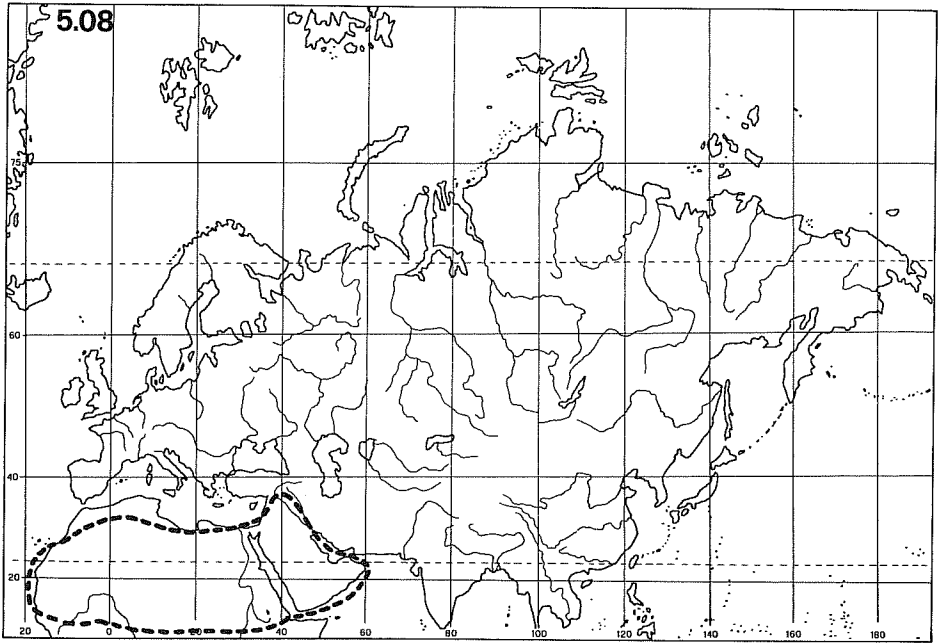


Fig. 31 - Saharo-Sahelo-Arabian chorotype (5.08 SSA).

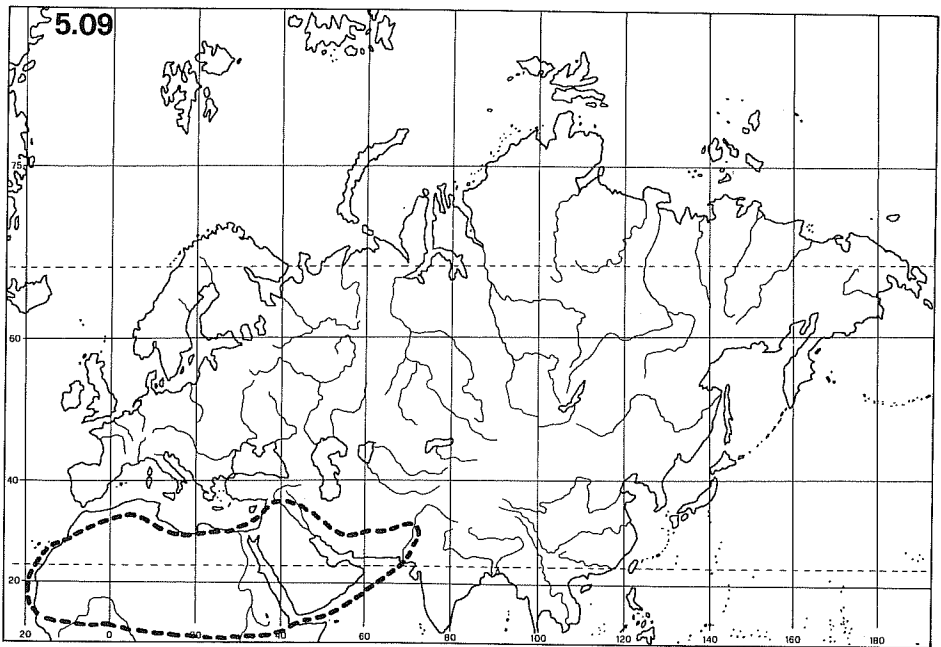


Fig. 32 - Saharo-Sahelo-Sindian chorotype (5.09 SSS)

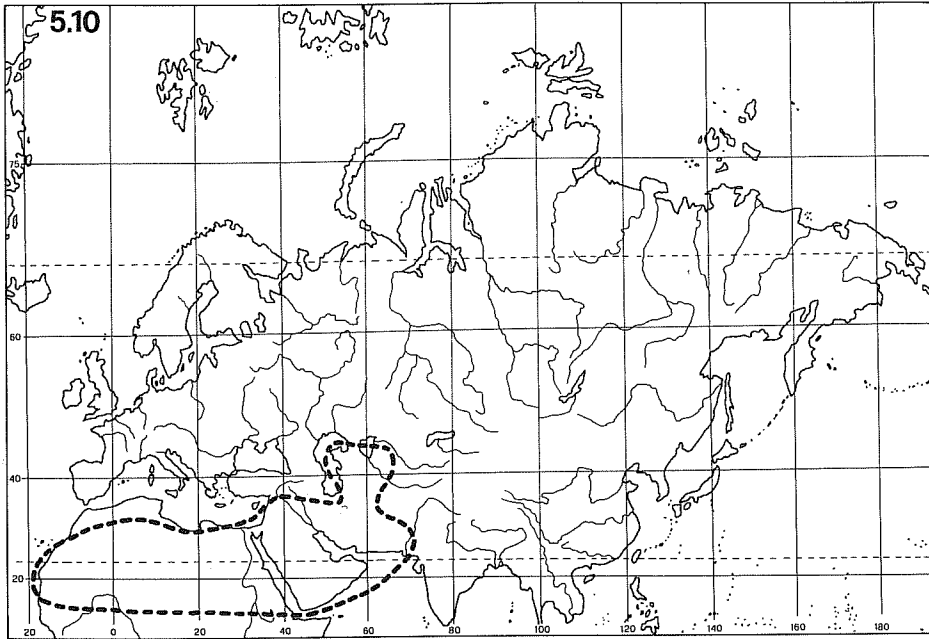


Fig. 33 - Saharo-Turano-Sindian chorotype (5.10 STS).

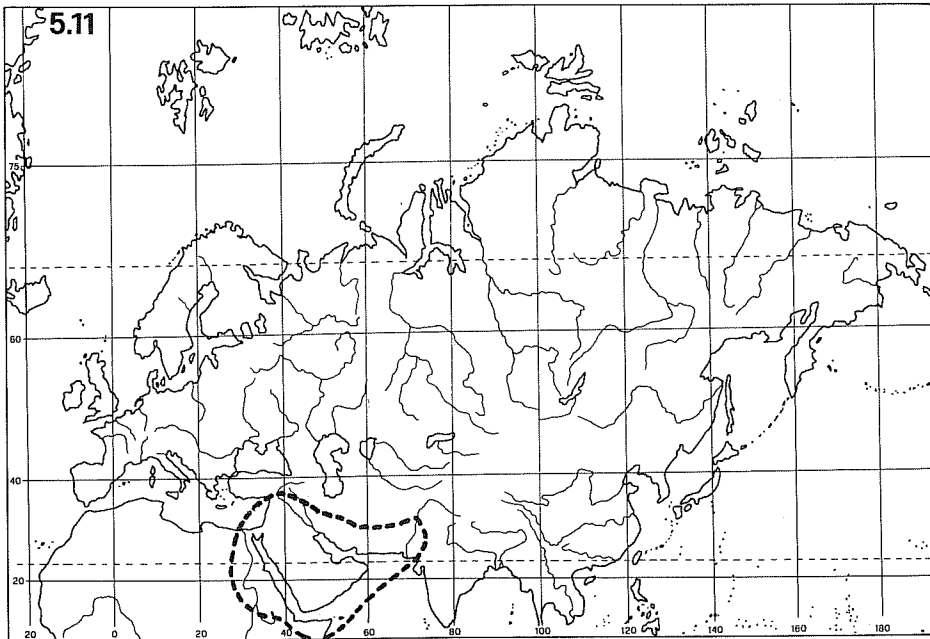


Fig. 34 - NE-African-Sindian chorotype (5.11 NAS).

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