

## Orta Anadolu'nun jeolojisi hakkında

*E. LAHN*

### *ÖZET:*

Burada tarif edilen mıntaka, Kuzey Anadolu iltivaları ile Güney Anadolu iltivaları arasında bulunan ara sahasının bir kısmıdır. Kırşehir masifi, Yukarı Sakarya 'masifi ve Akdag masifi, gibi kristalin ve plütonik sâhrelerden müteşekkil olan. eski masifler, bu bölgenin temelini teşkil etmektedirler. Bunlara.- benziyen eski masifler muhtemel olarak Tuz Gölü ve Konya havzalarının genç (Neojen - Kuaterner) teressuplan ile örtülüdürler. Alpin ana Ütivajanndan ayırtaış olan kol iltivaları, masifler arasındaki tam rijit olmya,ı sahalara girmektedirler. Meselâ : Ankara ve Çorum yelpazeleri, Boz Dağlar Silsilesi. Eski masifler, ekseriyetle, Tuz Gölü havzasının doğu kenarından geçen fay gibi tektonik arızalar tarafından çevrilmiştirler. Böylece, iki alpin ana uçları arasında bulunan ara bölgesi, hakikî bir ara. strüktürleri şebekesi (fay ve iltivakr) tarafından kaplıdır. Eski masiflerin kenarlarına veya kotaşu alpin iltivalarına muvazi olan bu 'strukturier, çeşitli tektonik nazariyelerin sebebi olmuşurlar, (meselâ: P, ARNI 1; N. EGE-RAN 8).

Muhtemelen kısa olan bir Üst Kretase- transgresyonundan maada (Tuz Gölünün kuzey-dogusunda inkişaf eden Hippurit'li kalker), Mesozoik denizi Orta Anadolu'ya girmemiştir. Buna nazaran daha uzun 'bir zaman süren Lütesyen transgresyonu tarafından bırakılmış teressüpler, bölgemizin bir çok yerlerinde keşfedilmiştir.

Bölgemizin en mühim kısımları Eosen'den sonraki tabakalar tarafından örtülmüştür: Kuaterner tatlı su (veya hafifçe somatr), Neojen tatlı su ve jipsli-tuzlu. Oligosen yatakları bölgemizin havzalarını doldurmakta, hattâ eski 'masiflerin bazı kısımlarını örtmektedirler.

Alpin orojenik hareket safhasından sonra meydana gelmiş şakulî kratojenik hareketler, bölgemizin tektonik. strüktürlerine hakimdirler. Bu kratojenik arızaların bazılarının çok genç olması, Üst Neojen tabakalarını ihlâl eden faylar tarafından gösterilmiştir. Hattâ, Konya havzasındaki Neojen ile Kuaterner tabakaları arasında 400 metreyi aşan bir şakulî atîmi gösteren bir dislokasyon tesbit edilmiştir. (14), Bunun gibi genç tektonik arızalar da Kırşehir-Yerköy ve Ilgın mmtakalarındaki sismik faaliyetin sebebidirler.

# On the Geology of Central Anatolia

*E. LAHN*

## *Introduction:*

The **intermediate** zone of Central Anatolia lies between the folds of **Northern Anatolia (Anatolides)** in the north and the folds of **Southern Anatolia (Taurides)** in the south. It consists of a system of basins, **tablelands**, isolated<sup>1</sup> folds, **volcanic** areas and **old** crystalline masses. The central part of this intermediate zone and its frame form the subject of the present paper. In our area, we can distinguish the major geological units of **the** central part of Anatolia and their components as follows: 1) parts of the **Anatolide** folds, as the fan of Ankara, the Çarıklı ~ İskilip Tanges and the fan of Çorum **representing** the western, northern and **nört-eastern boundary** of the area; 2) the **volcanic** zone of the Hasan Dağı in the **south-east** of the region and 3) the Inner part of the **Tauride** folds limiting the region in the **south**. The central part of Anatolia described here is divided by the high **grounds** of Kırşehir - Keskin and of the **Boz Dağlar** into three depressions, the Middle Kızılırmak » Delice **İrmak** basin, the Tuz Gölü basin and **the** Konya - Ereğli basin.

Details about parts of this **region** are scattered through the geological literature: Apart from P\* DE TCHIHAT-CHEFIF'S (22) early but **still** interesting **descriptions**, we find 'some preliminary details about **the** Ankara, Konya Tuz Gölü and Hasan Dağı regions in the papers **published** by E. CHAPUT (7); P. ARN! (1) has described the Kırşehir area and M/BLUMENTHAL (2-6) parts of the **Tauride** and Anatolide folds **bordering** our **region\*** The author of the present paper working in Central Anatolia since 1939 describes in **the following lines-the** essential geological features of **this** region, features which are typical of an **intermediate** zone of the alpine **system**.

## *The fan of Ankara:*

The folds composing **this** fan originate **in** 'the **Anatolide** folds from which they are detached in the Çankırı region in the north **and**

they plunge **under** the oligocène ~ Neogene cover of Central **Aiiato-Ha in the 'south**. This unit is divided **into** two areas **by** the axial elevation of the Eîma Dağı - **Idris Dağı** formed by **greywackes** without fossils **but** closely associated with **marbles** and limestones containing **Fu-sulinides**, as was established by E. CHAPUT (7).

The part of the Ankara fan situated west of the Eîma Dağı **axis**, and not described here, shows a varied **stratographical succession** extending from **Triassic to Eocene** (see: E. CHAPUT)« The zone east of Elma. Dağı is characterized by a very simple stratigraphic **column**. The oldest rocks of this region are green rocks accompanied by radiolarites, slates, and **limestones** without fossils. The age of **this** series has not yet been exactly established but a lower Mesozoic age is very probable, as was **supposed** by E\* CHAPUT (7)» This "green and red series" is overlain by **flysch** containing several limestone **intercalations and** including Upper Cretaceous, **Paleocene** and Eocene (up to the **Lutetian**). **As an** example of this development we indicate below the succession in the **Haymana region** south of Ankara (E. LAHN K. LOKMAN 16):

- 1) **Senonian** flysch (grey - blue marls prevailing) with *Hippurites*, *Gryphea* and *Nidinea*;
- 2) Marly *CycloUthes* - limestones **corresponding** probably to the **Macstrichtian** ;
- 3) Thin-bedded *Lithothamnium* limestones indicating the passage between Cretaceous and Paleocene;
- 4) Paleocene flysch characterized by **frequent conglomerate** intercalations and by its **darker** colours; **the** very rich fauna of **.. this horizon contains for instance numerous** *B<sup>^</sup>tillmia*;
- 5) Sandy and light Lutetian flysch with great *Nummulites* and *Assilina*.

The presence of this **uniform** succession **enclosing** the green red series **and** flysch can also be established on the southern border of the Can-kin - iskilip mountains and on the borders of the Çorum fan. This **development** is typical for the **"arrière-fosse"** situated between the **ABE-tolidé** ranges and **the Central Anatolian -intermediate zone**» In the

part of the Ankara fan described here the folding movement is directed from north or north - west to south or south-east towards the intermediate zone. Between Ankara and Haymana, the green rocks are pushed over the Paleocene flysch; east of Elma Dağı, Paleozoic slates and - limestones overlie the Mesozoic green rocks and radiolarites; "klippes" of Permocarboniferous limestone swim here upon broken green rocks. All these overthrusts are local and not of great horizontal extent, but they show the existence of tangential movements in a north-south direction.

*The Çankırı ~ İskilip Mountains:*

On the southern border of this range we find stratigraphical conditions similar to those observed in the eastern part of the Ankara fan. The Upper Cretaceous flysch here overlying the green-red succession is characterized by coloured toads, slates and conglomerate intercalations recalling the alpine "Gosau" facies. The Paleocene ~ Eocene flysch succeeding the Cretaceous is divided into a mainly lower and sandy upper series. Igneous intercalations (andesites and porphyrites) are frequent in the Upper Cretaceous and in the Eocene of this region,

Tectonic movement is ill-defined in this part of the Anatolide ranges, Near Tuşh (east of Çankırı), southwardly overturned folds of Cretaceous flysch overlie the Oligocene of the Kızıl Irmak basin. But in the İskilip region, the folding movement was from south to north,

*The Çorum fan:*

These folds originate in the north (as the Ankara fan does) in the Anatolide folds and disappear in the south under the oligocene of Central Anatolia, The fan consists of a central region of metamorphic rocks surrounded by the green-red succession overlain by Cretaceous flysch and light coloured limestones. The external borders of this structure are formed by Eocene flysch in which *Ampullina c/. willemeti* DESJHL and *Rhinoclavis cf. contractum* BELL, have been found proving the existence of the Auversian in these folds the Eocene succession of which finishes normally with the Lutetian.

In the south, near the margin of the Kırşehir Massif, the flysch passes to hard and yellow silicified marls with small *Nummulites* and is accompanied by basaltic flows.

*The Kırşehir - Keskin region :*

This Includes a system of elevations and tablelands belonging to the Kırşehir mass-and formed by igneous and cristalline rocks partially **covered** by Eocene, oligocène and Neogene deposits In our region **this**. sy stein separates the Kızıl İrmak ~ Delice Irmak basın from the **Tuz Gölü** 'basin, P» ARNI has made a general study of the Kırşehir piass {1 )=, The observation reproduced here have been made by **the** author, of the present paper In the Yozgat - Yerköy section.

The igneous -rocks of the region are of various types,, The oldest rock is a diorite the fragments of which are included In the main rock of uhe mass, **at** coarse-grained .granite often with large red feldspars« Younger dykes of cliorite, gabbro, aplite and quartzporphyry cut the granite (determinations: Mineraogical Service of the M. T. A« Insbk. tute in Ankara,)» White contact-marbles of very coarse grain are **fre-**  
**quent** in-our **part** of the Kırşehir massiv, but cristalline rocks (in the strict sense of the words) are rarely found there.

The age of our masif cannot be exatly established... **The** oldest strata overlying these rocks are Eocene beds, Mesozoic strata do not exist here and neither tectonic movement during the Mesozoic, nor in\*  
• trusion during this time can be proved in this part of **Anatolia**. Our **mass** is very probably an old massif of hercynian age.

In\*the Yozgat region the old mass is covered by "a series of Lute-tian marls, sandstones and conglomerates containing a rich fauna characterized by abundant big corals and big gastropods. The Eocene series is followed, for instance in the western part of our area, by gypsi-ferou«. Oligocène and Miocene-Pliocene freshwater beds.

*The volcanic zone of Hasan Dağı:*

This zone contains the 'most prominent topografic feature of our area, the Hasan **Dağı** (32ÖÖ m.). It forms the western part of a very  
• large **volcanic** region, the Hasan Dağı-- Erciyes Dağı area, covers more then **İ 0.000 km<sup>2</sup>**. In this part, volcanic activity-began with the deposition of dacitic and rhyolitic tuffs (following. E. **OHAPUT** 7) particularly in the country between the Karacadağ and Aksaray, Hippa-  
**rion** gracile has been found in the basal tuffs in the Ürgüp region (outside of our area)-and the tuffs must be (at least partially) of Upper Miocene age (E. **CHAPUT** 7)."

Andesitic and trachyandesitic rocks succeeded the deposition of the tuffs (determination: P. DE WIJKERSLOOTI, 24), This phase of volcanic activity has furnished both large area flows and also volcanic cones, the most important of which are the Karacadağ and the **Mekendiz Dağları**. The andesitic eruptions were followed by a basaltic phase- characterized by well-preserved volcanos, like the large cone of Hasan Dağı or the craters and crater-lakes of Karapınar (E. LAHN, 11, 12). Near Karapınar the strand-cliff of the Konya Quaternary lake is cut into the basalts. The basalt flows from Hasan Dağı descend to the actual plain south of Aksaray. The extrusion of the basalts therefore began early in the Quaternary, before the formation of the Konya lake, and finished only towards the end of this period. Branches of the Hasan Dağı volcanic zone cross the Konya basin and reach westward into the Konya; region: rains of andesitic volcanos built upon a large basement of tuffs like the Karadağ, the Erenler Dağları or the hills of Sile near Konya.

*The ridge of the Bozdağlar:*

The Bozdağlar, separating the Konya basin and the Tuz Gölü basin, originate, in the East, in the Bolkar Dağı -range, a part of the interior Taurus folds. The hills of the Iğın region are the western extension of the Bozdağlar, In the north, branches of the Bozdağlar constitute isolated elevations in the Tuz Gölü plain,

. Grey marbles predominate in the Bozdağlar, (the name means "grey mountains"), but quartzites, serpentines and diorites also occur. The only fossils found were *Radiolaria* and sections of a badly preserved algae similar to the Permocarboniferous *Mizzta velebitata* SCHUBERT, A Permocarboniferous age for the Bozdağlar (except perhaps for the green rocks) is very probable. This is supported by the close relations between this range and the Permocarboniferous mass of the Bolkar Dağı.

During the cratogenic movements following the alpine paroxysm, the Bozdağlar were cut by numerous faults and divided in several blocks which explains the complicated outlines of this unit.

*The Taurus Folds of the Konya - Beyşehir - Ereğli region:*

Only the northern (interior) part of the Taurus folds, constituting the southern frame of Central Anatolia, belongs to our area. This

part of the TPauride folds is composed of\* several zones, as the zones of Niğde, Ereğli, Bolkar **Dağı** (described by B. BLUMENTHAL, 2 and E\* CHAPUT, 7) and Beyşehir. In the region of the lake of Beyşehir, the base of the Beyşehir zone is represented by lightly metamorphosed slates, crystalline limestones and quartzites forming the range of the Sultan **Diaglam** (south and south-west of Iğın)» Sections of *crinoids* and **undeterminable gastropods** are- **the**<sup>f</sup> only fossils found in these strata **provisionally-assigned** to the Upper Paleozoic, This series, is overlain by **sericitic** and sandy red or greenish slates recalling the alpine Werfe**man**« To the south of the lake Beyşehir, these slates pass upward **into** dark limestones with *crinoids* corresponding *probably* to black limestones found on the top of the slates **north** of the Beyşehir **Gölü** where they contain sections of\* big *Diplopora* resembling species frequent in the Middle Triassic of the Eastern Alps and the Dinaride ranges. The *Diplopora* limestone is overlain by a very thick succession of bedded and **imbedded** limestones **alternating** with dolomites, **taarls** or **sandy** strata» The presence of a **Liasic** horizon («marls with *Astarte* sp\*<sub>5</sub> following the **Paleontological** Service of the M. Tl A« Institute) and of Upper Cretaceous **Hippurites** limestones has been established in **this**-series **the** top of which is **formed**<sup>l</sup> by sandy limestones with little *Nutm~mulites*. In this part of **the** **Toros** there exists therefore a limestone series extending from, the Middle Triassic to the Eocene without any obvious discontinuity, like the series found by A« **PHILIPPSON** in South-Western. Anatolia and in Greece (18),

**In** the Beyşehir region; narrow scales of flysch **strata**, slates, limestone Mocks,, **radiolaiites** and' a mixture of basic rocks (serpentine, diorites, **melaphyres** etc«) appear between the limestones, from which they **are** always separated by faults or **over-thrusts**. The age of these rocks is considered provisionally as Mesozoic in general but cannot be determined with any greater accuracy.

The scales of the Beyşehir region were pushed north- (or north-east-) wards, against the Central Anatolian masses. It must be added that in **the** southern parts of the Toros a very clear movement in the opposite sense has been-established **by** M. BLUMENTHAL (6),

*The basin of the Middle Kızıl Irmak ~ Delice Irmak: . ' .*

This basin is largely occupied by the "gypsiferous formation". The base of this series is formed by grey sandstones and conglomerates

including sometimes volcanic flows« These are followed by bedded, red or brown sandstones the lower beds of which contain rock salt and little gypsum occurrences. Saltwater and salt springs are frequent. Springs and rock salt occurrences are not related to "salt domes" as has been supposed (C. E. TAŞMAN 20), except for the great occurrence of Kayatuz Mağarası near Çankırı which shows effectively dome structures, the thickness of salt occurrences is not usually sufficient for the formation of dome structures due to movements in the salt-masses« White and very gypsiferous marls overly the coloured sandstones« The marls sometimes pass into 'mayfly limestones.

This gypsiferous formation with its white or red coloured strata predominates in Central Anatolia where it dominates the landscape of large areas of the country (The principal river of this region, the Kızıl Irmak [= "Red River"<sup>5</sup>] takes its name from the material derived from the destruction of the gypsiferous beds and giving to it its typical 'colour). The absence of fossils permitting an accurate stratigraphical classification makes difficult the establishment of the age of our series formed evidently in temporary lagoons, lakes and swamps in desert climate. We can establish only that our series covers the Eocene flysch the top of which is formed by Lutetian (or-sometimes Auversian) strata and that it is overlain itself by marine Burdigolian and Helvetian 'beds in the Sivas region (see V. STCHEPINSKY 19). The gypsiferous formation therefore must be included in the interval between the Middle Eocene and the Burdigalian, especially in the oligocène»

In the South, the oligocène covers simply the rocks of the Kırşehir mass. On the other hand, tectonic complications can be observed in the northern part of the Kızıl Irmak basin the border of which is formed by alpine elements, A very sharp discontinuity here separates the gypsiferous formation from the Eocene flysch and dislocations are frequent on the borders of the basin in the gypsiferous beds. Frequently, gypsiferous strata are inclined towards the Eocene flysch and in the neighbourhood of Tuht (east of Çankırı) the Upper Cretaceous seems to be pushed over the gypsiferous beds. In the marginal zone of the basin, oligocène strata are considerably folded (but not so intensively as the neighbouring flysch!). The axes of these gypsiferous structures are always parallel to the neighbouring alpine folds; A light discontinuity can be established between the lower red and the upper



white parts of the Oligocène, it is **not** only that tectonic movement is less **intensive** in the white part than in the red, but the white strata sometimes pass over the **limits** of the 'lower red part and directly cover the basement rocks.

*The hash of the Tuz Çölü:*

The oldest strata found in this large depression situated in the center of Central **Anatolia** are some isolated outcrops of *Hippurites* limestones (Upper Cretaceous) and *NummuUtes* sandstones discovered in the escarpment bordering the Tuz Gölü basin in the east (23 and W, TROMP, oral information). These outcrops are overlain by the **gypsiferous** formation divided into two parts as in the Kızıl Irmak basin« In the north-western corner of our **basin**, a discontinuity separates the **gypsiferous** formation **from** the underlying Eocene **flysch** (Ankara fan), but east of the Tuz Gölü, the Eocene passes to the gypsiferous without any hiatus,

A very large and thick series of white or yellow freshwater deposits (limestones and **marls**) **overlying** the gypsiferous formation occupies **the** greatest part of our depression, covering more than **5000** km.<sup>2</sup> (together with the neighbouring Upper Sakarya basin). At the borders of the basin, passages **from** limestone or marl to clastic deposits (such as conglomerates or sandstones) on to tuffs can sometimes be observed. Very many freshwater fossils such as *Umnaea*, *Planorhis*\*, *Bihynia*, *Viiipara* and *Hydrohia* can be found in this series. The recent character of this fauna (the species of which are living even today in the waters of the region), together with the absence of any trace of folding in these deposits make it necessary to assign a **very** recent age to this series, P. *Oppedheim* (18) has put into **the Pontian** similar **strata encountered** in Western Anatolia, But a Pliocene age for these freshwater **marls apâ** limestones is not **impossible** • (E. LAHN 14).

There is no trace of folding in the Neogene deposits of the Tuz Gölü basin« Very slight tectonic movement can be established! only on the borders of the basin between the Neogene and the older rocks. In the great Neogene depression is included a less extensive basin **containing** the actual lake with its alluvial plains and limited by a system of faults and fault-scarps (like the steep slope formed by the Neogene limestone' on the southern **border** of the Tuz **Gölü** plain

or the escarpment of Koçhisar) younger than the Neogene deposits which are themselves affected by these tectonic accidents. Similar statements - secondary young basins of tectonic origin occupied by actual lakes or by Quaternary lake deposits, within larger Neogene depressions - have also been made for the **Konya\*** basin and for the "region of lakes" of the Western Toros (E. LAHN 13).

The extremely high salinity of the **Huz Gölü** (its name signifies: Salt lake) is not entirely due to the rapid evaporation in this large but shallow closed basin; salts are brought into the lake also by rivers originating in the gypsiferous and salty areas (Oligocene) east and north of the Tuz Gölü basin (see also: C. E. TASMAN 21 and E. LAHN 15).

*The Konya -Ereğli haşiri:*

This large basin is situated between the Toros folds, the range of the **Bozdağlar** and the Hasan Dağı mass. Neogene freshwater deposits similar to those described from the Tuz Gölü basin are visible in the marginal zone of this depression also. In its eastern corner<sup>1</sup> outcrops of Oligocene have been found. The central part of the basin is occupied by sand, clay and pebble beds, the deposits of the large Quaternary **Konya** lake, E. CHAPUT (1), H. LOUIS (17) and the author of the present paper (14) have collected here numerous fossils (**Limnaea**, Vivipare, Neritina, Dreissensia, Adacea, **Pisidium** etc) representing a freshwater fauna with slight brackish tendency.

The Konya basin is a depression of tectonic origin, as it is proved by numerous tectonic disturbances on its borders« A younger system of dislocations sometimes forming scarps separates the Quaternary and the Neogene deposits. Here we have also two tectonic depressions of different ages, the one intercalated in the other one. The Konya basin is a closed depression with subterranean karstic drainage (E. CHAPUT 7).

*Conclusions:*

The region described above belongs to the "Intermediate Zone" of Anatolia situated between the Anatolide ranges in the North and the Tauride ranges in the South, The basement rocks of the region consist of some (probably old) masses of crystalline and igneous rocks,

as the Kırşehir mass described here«, the „mass of the Upper Satar y a River occurring to the west of the Ankara fan and the Akdağ 'mass situated ea^st of the Çorum fan, other similar masses are probably cöYered by the young. (Neogene and Quaternary) deposits of the Tuz Gölü and Konya basins. Folds originating in the main alpine folds of the north (Anatolide ranges) ond of the south (Tauride ranges) enter in the less rigid space 'situated between these old rigid masses: For-example, the fans of Ankara» and Çorum and the Bozdağlar ranges.. Fault systems very often surround the old masses-; the faults bordering the Kırşehir 'mass in the southwest (eastern siele of the Tuz Gölü basin) is a very good example of such a structure. T!ius, a veritable network of intermediate structures (folds apnd faults) corresponding to less rigid zones between the" old rigid masses covers the space between the two alpine maiz-zones in the north and in the south. The trend of these structures follows the outlines of the old masses and the structures seem to pass from one to the other of the alpine mainzone and have thus given rise to very contradictory tectonical theories, (see P. ARNÎ 1, N. EGERAN 8).

.Except for a. probably brief Upper Cretaceous transgression (deposition of Hippurites 'limestones north-east of the Tuz. Gölü), the Mesozoic sea! did not reach into Central Anatolia, The Lutetian transgression is considerably more extended and its deposits have been found in several localities of our country.

The greatest part of our intermediate region is covered by post - eocene deposits: freshwater (or slightly brackish) Quaternary, freshwater Neogene and oligocène gypsiferous beds occupy the depressions of; the region and even some parts of the old masses. The origin of the oligocène gypiferous formation, so typical of a great part of Inner Anatolia can be explained by the unstable geographical conditions in the time between the ajpine folding and the disappearance of the Eocene Sea on the one hand and the formation of a regular hydrographical systöm on the other side. In the transitional period, salt-water lagoons (relics of the older Eocene Sea) are still persisting along side of freshwater basins within a region of more or less desert climate.

Hie limits of our intermediate zone.towards the alpine ranges in the north and in the south are characterized by the absence of any sharp border line« Tectonic units originatdng in the alpine main-zones

penetrate into the intermediate area, "Arrière-fosses" with prevailing flysch beds, accompanied by green rocks and **radiolarites**, appeared on the inner (southern) side of the North Anatolian **folds**-(in the Ankara - Çankırı - Çorum region) and on the inner **border of** the South Anatolian folds (in the Ereğli region). **Advancing** from the intermediate zone towards the alpine folds, it is only after the arrière-fosses have been **past**, that the **"notfinal"** rich fades of the **alpine-folded** system begins.

The tectonics of the intermediate zone (excepting the alpine folds penetrating into this zone) are dominated by the vertical movements of the cratogenic phase succeeding the alpine folding movements. Some of these cratogenic **disturbances** are very young, as is proved by faults affecting the Upper Neogene deposits; in the Konya basin a fault with a vertical **displacement** of more than **400 m** separates Neogene and Quaternary deposits (14). To **the** presence of such young movements must be attributed the seismic activity in the Kırşehir - Yenköy and in the Ilgın regions (P. ARNÎ 1, E. CHAPUT 7).

Generally, the **"alpine"** tectonic geologists interpret the «intermediate'zone» separating the two main-zones of the alpine system, as a unit similar to the **Danübian intermediate** mass (between Carpathian and **Dinaric** Ranges). Here, all structures are **buried** under a thick (several thousands of meters) cover of **Oligocène** and Neogene beds and this **intermediate** zone seems therefore to be a homogenous unit. Only geophysical investigations could prove the existence of the various structures hidden by the young cover« The central part of Asia Minor has not been reached by Oligocène and Neogene **transgressions** and the structures of this area rested largely exposed, giving us a picture of the tectonic complications which exist in an intermediate area of the alpine zone.

## BİBLİYOGRAFİ — REFERENCES

- 1 ARNI (P.)v Zum Erdbeben von Kırşehir, Yerköy und Keskin. M.T.A. B/1, 1))38, Ankara.
- 2 BLUMENTHAL (M.), Aperçu de la géologie du Taurus dans les Vilâyets de Niğde et d'Adana. M.T.A. B/3, 1941, Ankara.
- 3 " Le dispositif géologique du secteur petrolifère de Boyabat. M.T.A., A/6, 1942, Ankara.
- 4 " Géologie des 'montagnes de la transversale d'Es kipazar. M.T.A., 3/24 - 4/25, 1941, Ankara,
- 5 •• Sind gewisse Ophiolitzonen Nordanateliens praeliasisch? M.T.A., 1/33, 1945, Ankara.
- 6 ? Sehiçhtfolge u. Bau der Tiorosketten in Hinterland von Bozkır, Istanb. Univ. Fen Fak. Mecm., IX B/2, 1945, Istanbul
- 7 CHAPUT (E.)» Voyages d'études géologiques et géomorphologiques en Turquie. Paris 1936.
- 8 EGERAN (N.), Tectonique de la Turquie. 1947, Nancy.
- 9 EGERAN (N.) - LAHN (E.), Türkiye Jeolojisi. 1948, Ankara,
- 10 LAHN (E.), Les- phénomènes de karst de la région de Konya. MT.A., 4/21, 1940, Ankara,
- 11 ? -Konya - Aksaray volkanik arazisi, M.T.A., 1/22, 1941, Ankara.
- 12 ?? Le volcanisme neogene et quaternaire en Anatolie. Türk Congr. Derg., 3/7-8, 1945, Ankara.
- 13 ?? Cdntributions à l'étude geomorpäoloigique des lacs du Toros Occidental M.T.A. 2/34, 1945, Ankara,
- 14 " Les dépôts pliocenes et .quaternaires de la région de Konyaj - Bu-ndur« Istanb. Univ. Fen Fak, Mecm. XI B/2<sub>5</sub>, 1946, Istanbul.

- 15 " Contribution à l'étude géologique et géomorphologique des lacs turcs. M.T.A., B/12, 1947. Ankara.
- 16 LOKMAN (K.) - Lahn (E.), Géologie de la région de Haymana. M.Tj.A., 2/36, 1946, Ankara.
- 17 LOUIS (H.), Eiszeitliche Seen in Anatolien. Ztschr. Ges. f. Erdik. 7/8, 1938, Berlin.
- 18 PHILIPPSON (A.I, Reisen u. Forschungen in Westkleinasien. Pet. Mitt. Erg. H., 1911 - 1915, Gotha.
- 19 STCHEPINSKY (V.), Faune miocène du Vilayet de Sivas, M. T.A., C/1, 1939, Ankara.
- 20 TAŞMAN (CE.), Salt domes of Central Anatolia. M.T.A., 4/9, 1937, Ankara.
- 21 " Tuzlarımız. M.T.A., 1/33, 1945, Ankara.
- 22 TCHIHATCHEFIF (P. de), Asie Mineure. 1866 - 69, Paris.
- 23 TÜRKİYE JEOLJİK HARİTASI 1/800.000, M.T.A., 1941 - 45, Ankara.
- 24 WİJKERSLOOTH (P. de), Ueber den jungen Vulkanismus am Innenrand des Taurus zwischen Afyonkarahisar und Kayseri. M.T.A., 2/32, 1944, Ankara.

*LEVHA— PLATE I. . . .*

*Orta Anadolu'nun jeolojik krokisi: (1/))00.000 ölçekli Türkiye jeolojik Haritasına göre çizilmiştir).*

*Geological sketch-map of Central Anatoli: (following the Geological Map of Turkey 1/800.000).*

*işaretler • — Legend:*

İ — Alüvyonlar, KSuaterner ve Neojen — Alluvium, Quaternary, Neogene,

2 — oligosen — Oligocène.

3 — Genç volkanik arazi — young volcanic rocks.

4 — Kîzly Anadolu İltivaları — Folds of Northern Anatolia,

5 — Bu iltivalarıû iç-ili sahası — Item, arrière-fosse 5a — Elma Dağı Eşiği — Ridge of Elma Dağı.

6 — Kırşehir masifi — Masif of Kırşehir.

7 — Bozdağların ara iltivaları — Intermediate folds of the Bozdağları.

8 — Niğde Kristalin zonu — Cristalline zone of Niğde.

9 — Ereğli iç-ili sahası — Arrière-fosse of Ereğli.

10 — Boîkar Dağı zonu — Zone of Bolkar Dağı.

1 1 — Beyşehir zonu — Zone of Beyşehir.

İ l a — Sultan Dağı Eşiği — • .Axis of the Sultan Dağları.

A — Ankam, Ak — Aksaray, An — Antalya, BG — Beyşehir Gölü, BD — Boz Dağlar, BK — Bolkar Dağı, Ç — Çankırı, Ço — Çorum, E — Ereğli, ED — Elma Dağı, ER — Erenler Dağları, H — Haymana, HD — Hasan Dağı, Ig — Ilgın, îs — İskilip, K — Konya, Kfp • — Karapınar, Kr — Kırşehir, Me — Mersin, N — Niğde, S — Sinop, SD — SultaB Dağları, TG — Tuz Gölü, Y • — Yozgat

*LEVHA — PLATE IX*

*Orte Anadolu nun tektonik krokisi — Tectonic sketch of Central Anatolia.*

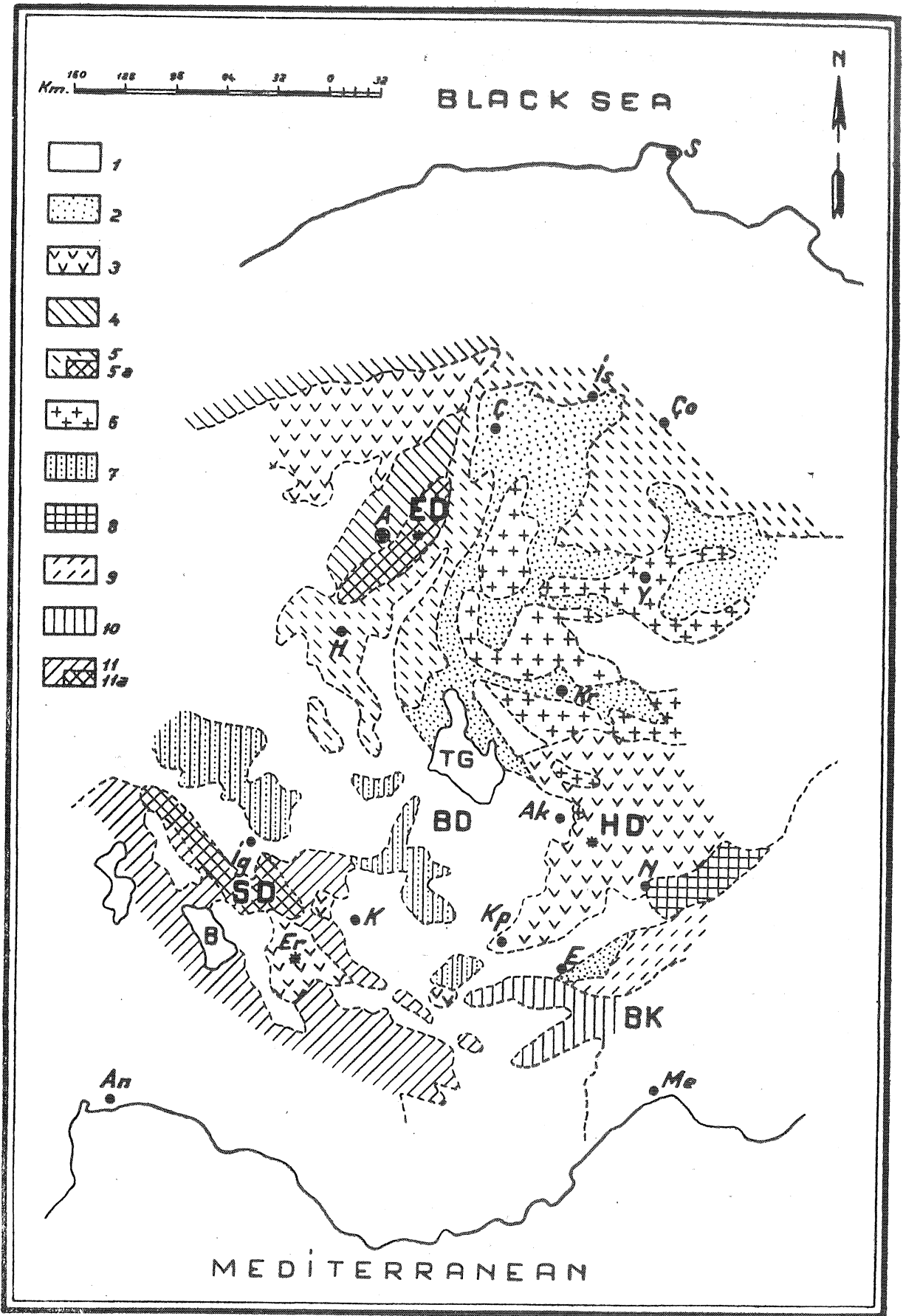
*işaretler — Legend:*

- 1 --- Tektonik birliklerin hudutları — Limits of the tectonic units.  
2 — Genç volkanik arazi — Young volcanic masses,  
3 — • İltivaların mihverleri — Axes of the folds.  
4 --- Mühim tektonik arızalar — Important dislocations,  
BD — Orta Kızılırmak — Delice Irmak havzası — Basin of the middle Kızılırmak — Delice Irmak.  
BK — Konya havzası — Basin of Konya,  
BS — Yukarı Sakarya Nehri havzası — Upper Sakarya basin«  
BT --- Tuz Gölü havzası — Basin of Tuz Gölü.  
FA — Ankara yelpazesi — (Fan'of Ankara.  
FÇ — Çajınım yelpazesi --- Fan of Çorum..  
KA — Kırşehir — Akdağ Madeni 'masifi — Masif of Kırşehir — Aktağ Madeni.  
MS — Yukarı Sakarya Nehri masifi — Upper Sakarya massif.  
VA — Ankara volkanik zonu — Volcanic area of Ankara.  
VH — Hasan Dağı volkanik zonu — Volcanic zone of Hasan Dağı,

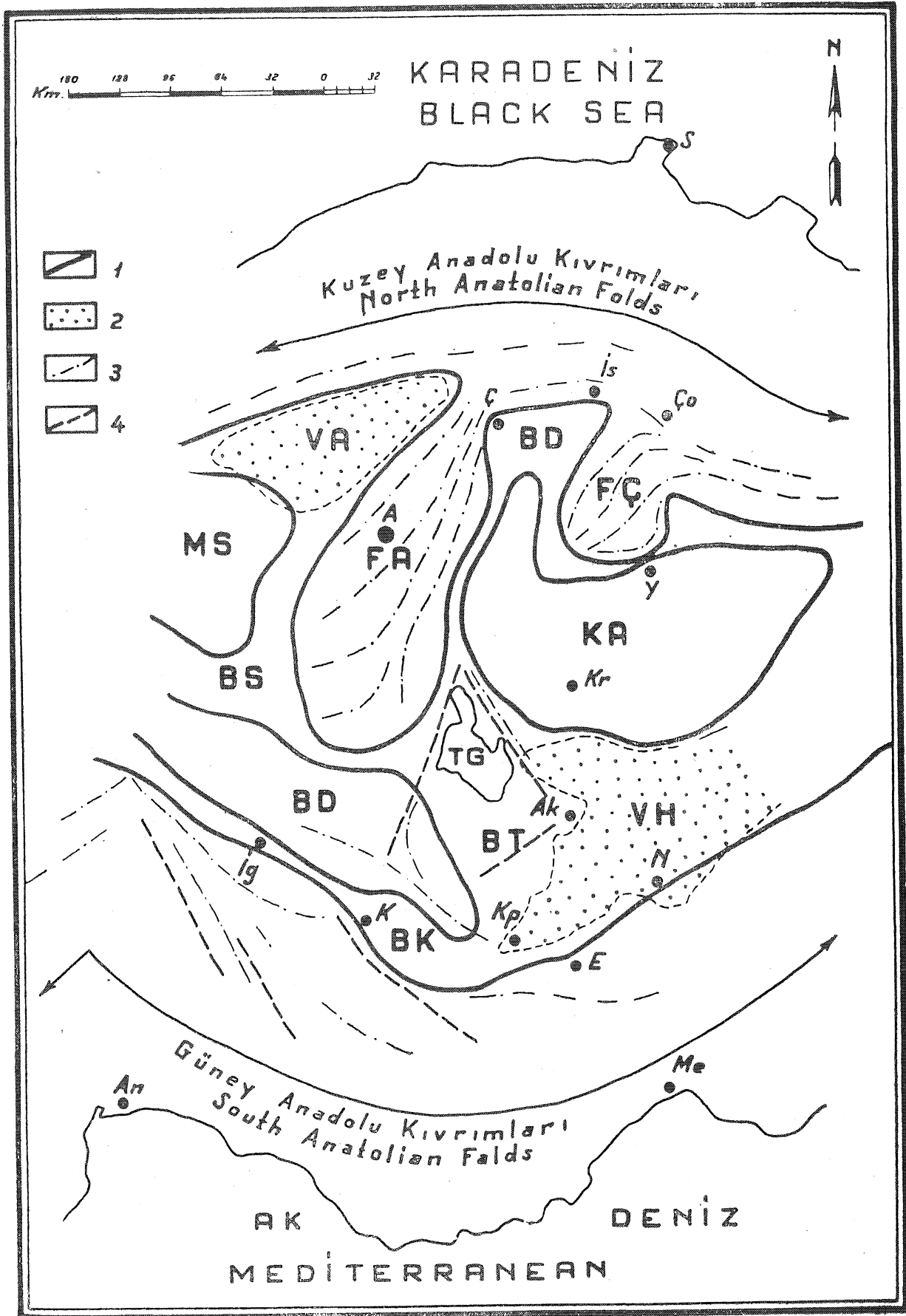
Şehirlerin isimleri: 1 No, lu levhada.

Names of towns: see Plate I.





LEVHA - I - PLATE



LEVHA — II — PLATE