Introduction

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"Istanbul'un taşı toprağı altındır", says a popular Anatolian expression, i.e. "Rocks and soil are gold in Istanbul" or "Istanbul is paved with gold". As far as I know, rocks and soil in Istanbul are not golden, except they may contain some coins and other precious items left by Greek, Roman, Byzantine, Ottoman and Turkish civilizations that inhabited this land since the dawn of time. Actually by all Turks and before them by Ottomans, this expression is understood as "Istanbul is the city of prosperity". Istanbul has attracted across the centuries people from the countryside with the hope to find fortune through trade, exchange or education. They established shops and factories, and settled their homes there with the hope of finding fortune. Indeed, Istanbul was, and still is, the city where the poor populations of Anatolia and the Balkans dreamed to find job and prosperity for them and their descendents, although leaving home is felt as pain and cause of eternal longing. Consequently, Istanbul became one of the most cosmopolitan cities of Europe, with a mixture of populations of different origins, different cultures and different religions. It is also the city that feels deeply the results and problems of rural exodus.

I cannot say if the present day Istanbul megacity is a haven of peace and prosperity for everyone. However, it certainly was in the past. The vertebrate fauna unearthed at Küçükçekmece, in the western suburbs of this city, is a valuable witness to affirm that paradise existed in this region some nine million years ago. In the following pages of this volume, the inhabitants of this paradise are presented to the reader one by one. They were studied in several papers by renowned paleontologists. These studies evidenced a large diversity of mammals inhabiting this region some nine million years ago. Their diversity and abundance show that habitats were very diverse in the Istanbul to offer shelter and supply food for many herbivorous and carnivorous mammals: a kind of Garden of Eden for mammals when they were living there. Elephantoids, giraffes, rhinos, beavers, antelopes, hyenas and many other beasts wandered around Istanbul along the margin of a bay or an estuary. Before telling about the environment in the region of Istanbul some nine millions years ago, it is better to tell about the site itself which yielded this fauna.

The fossiliferous site of Küçükçekmece was discovered by Ahmet Malik (1892-1965, Ahmet Malik Sayar after the 1934 Surname Act) on April 12th, 1932. During a field training with his students in the western suburbs of Istanbul, he observed bones coming out in a sand quarry near the village of Küçükçekmece, along the eastern bank of the lagoon of the same name. Professor Ahmet Malik was a geologist as understood at that time, i.e. not specialized in a branch of geology, but a naturalist of earth sciences. Ahmet Malik knew that the geology is learned both in the field as in the classroom, and for field practice, he took his students as often as possible for field training on outcrops in the vicinity of Istanbul. His discovery of the Küçükçekmece fossil site gave a new direction to his scientific objectives. After discovering this fossil site, Ahmet Malik decided to search for more fossils and to communicate on the wildlife. In collaboration with his colleague, the geologist Hamit

FIG. 1. — Ahmet Malik Sayar presents some proboscidean cheek teeth and tusk fragments from Küçükçekmece to Celal Bayar, President of the Turkish Republic, on June 2nd, 1952. The lady on the left hand side is Professor Cazibe Ariç-Sayar (courtesy of Celâl Şengör, Istanbul Technical University).

Nafiz (H.N. Pamir after the 1934 Surname Act), they began the excavations at Küçükçekmece and unearthed hundreds of specimens of mammals, reptiles and fishes. With the permission and financial support of the university's rector, Malik and Nafiz conveyed the Küçükçekmece fossils to the Natural History Museum of Paris. They studied there all vertebrate remains that this site yielded with the advice and help of Marcellin Boule and Camille Arambourg, eminent vertebrate paleontologists in this institution. They compared the Küçükçekmece fossils with those from well-known Miocene localities of Europe and Asia, which were available in the rich collections of this museum. They drafted soon the manuscript that was published in March 1933 as a monograph in the Publications of the Institute of Geology of the University of Istanbul. This monograph of 119 pages includes also one map and 16 plates with the photos of the site, of the excavation and of the best specimens of mammals. This is the first comprehensive work on Turkey vertebrate fauna and the first work in vertebrate paleontology by Turkish researchers (Fig. 1).

The presence of Tertiary sedimentary formations west of Istanbul is known since Edouard De Verneuil (1837). In 1836, this Parisian geologist (1805-1873) undertook a "voyage d'étude" to the Crimea, and on his way back he stopped in Constantinople (Istanbul today). During his stay in Turkey, De Verneuil traveled around Istanbul and interested to the formation of Bosphorous, then he went to Prince Islands in the Marmara Sea, to Bursa where he climbed Mount Olympus (Uludağ), and he finished his peregrinations in Smyrne (Izmir) to embark for France. When in Istanbul, De Verneuil (1837: 271) observed that "ancient monuments of the city of Constantinople, its walls and bastions, beautiful aqueducts of Justinian and mosques erected by the sultans are built of white stone full of shells, and from the first glance they seemed Tertiary". Then he sought the quarries where the stone is mined and observed that "about three leagues distant from Constantinople between Daoud Pasha and Makrikoï, the ground is completely disturbed by old abandoned quarries... of which the stones used for construction of Constantinople are extracted from its foundation until today". From his observations, he drew up the first geological map of the Istanbul region. On this map Tertiary deposits are clearly delimited west of the city, including the Küçükçekmece region. Another

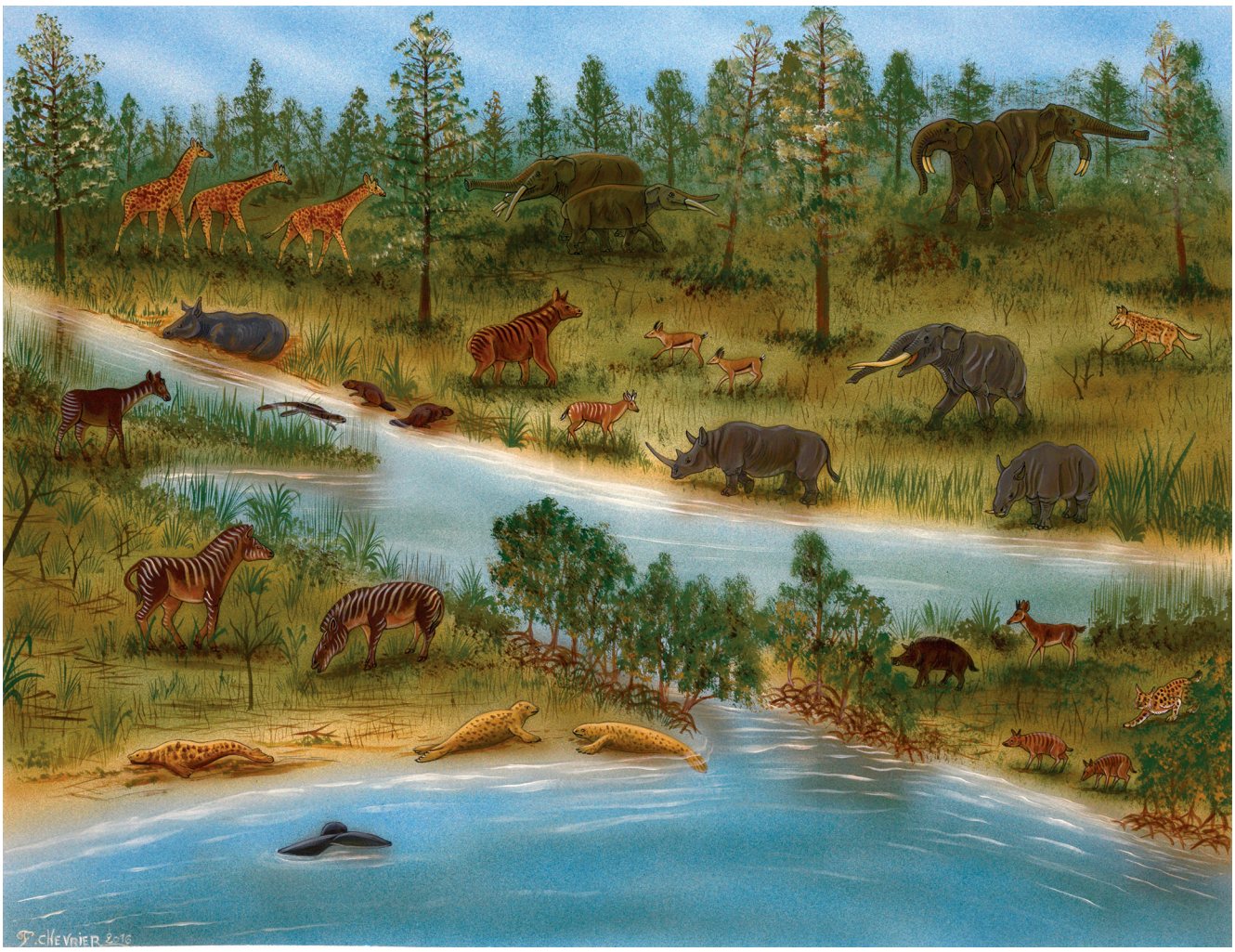

Fig. 2. — Artist reconstruction of the environment in the Küçükçekmece region with some key elements of its mammalian fauna by François Chevrier (Orléans).

issue of his interest is the formation of the Bosphorus, an issue debated since the time of Greek philosophers. From his observations, he concluded that "the existence of the Straits which communicate the Black Sea with the Mediterranean is not from an ancient geological epoch, and it is towards the end of the Tertiary period that it would place the dislocation that gave them birth" (De Verneuil 1837: 273). His opinion was confirmed by the research of the 20th century. The Bosphorus was initially a valley which was invaded by the sea at the end of the last glacial age, some 10 thousands years ago, when the sea level rose by 100 m (Lom *et al.* 2016).

Later on, several scholars traveled in the region of Istanbul to research its geology and stratigraphy of sedimentary deposits. Among them August Viquesnel (1800-1867) and Petr Alexandrovich Tchihatcheff (1808-1890) made probably the most reliable observations dealing with the succession of Cenozoic sedimentary units, their age and the tectonic events to which they were subjected. In the first chapter of the present volume, I developed an historical account of stratigraphic and paleontological investigations in the Istanbul region, particularly insisting on studies on the Tertiary deposits and their stratigraphic context. These authors also collected fossils to determine age correlations of the sedimentary deposits that they described, although their discoveries were limited to invertebrates. They have not had much chance to collect vertebrate fossils, except a few fish fossils from an underground quarry near Bakırköy that Tchihatcheff obtained from workmen. Nikolai Arabu (18??-1948), a Romanian geologist, discovered first remains of fossil mammals at the vicinity of Küçükçekmece, on the seashore between the Küçükçekmece Lagoon and Ambarlı village, and in two notes (1913, 1916) he mentioned the record of a giraffid *Camelopardalis attica* and a molar of an antelope. In later years, some other sporadic discoveries in the region provided Mastodon fossils.

In April 1932, when Ahmet Malik saw the bones coming out in a sand quarry near the Küçükçekmece Lagoon, he had in mind the knowledge of all these previous works, and he was aware of their rarity, but also of their great interest for natural sciences.

The eyes see only what the brain knows, or at least it has the curiosity to know. During a survey in Turkey, I saw bone fragments dribbling along a hill slope. I wanted to share my joy with a geologist colleague who accompanied me, pointing to the bone fragments scattered on the slope. His reaction was to say "that's fossils you seek. I would have taken them for vulgar pebbles and give a kick". To many geologists, fossils are only a tool for dating sedimentary rocks, no matter whether vertebrate or invertebrate, provided they give an age. But the opinion of Ahmet Malik was different. He knew that the fossils are above all the remnants of organisms that lived in geological times, in the place where they are found. Therefore they are the witnesses of the life on the land or in the sea, where they lived, and they represent the missing links in the evolutionary process of organisms. In his book entitled "Jeoloji ve Mineraloji", published in 1932, about hundred pages are devoted to paleontology with illustration of many fossils including vertebrates and some elephantoid remains found near Küçükçekmece.

Malik & Nafiz (1933) identified in the Küçükçekmece fauna 23 species of mammals, four reptiles and some indeterminate fish species. The systematics of all these taxa need to be updated. In addition, Father Jean Nicolas (1978) collected new material from the same fossiliferous horizon at the western part of the Küçükçekmece Lagoon, and this material remained unstudied, except the short notice of Nicolas (1978). The present volume provides detailed data on the geological and stratigraphic context of the Küçükçekmece fauna, and extensive systematic studies of all mammalian taxa that it contains. The new results evidence the occurrence of three species of proboscideans, nine species of carnivores, two hipparionine horses, three rhinos, one chalicothere, one aardvark (one molar, not described), one suid, one tragulid, one cervid, three giraffids, six bovids, two insectivores, one lagomorph and three rodents, altogether at least 37 species of mammals.

In addition to its exceptional diversity, the interest of this fauna lies first in its composition, and second in its location. For the first aspect, this fauna consists mainly of terrestrial species, but it also contains marine species such as seals and cetaceans. Such a combination is rarely known in paleontology and clearly indicates that the deposit is formed in a seashore or in a delta or lagoon environment. Malik & Nafiz (1933: 24) already underlined this particular situation, noting that "most vertebrates from Küçükçekmece are terrestrial, and a few others are marine animals. Consequently, this fauna inhabited the shores of a bay or of an estuary, where rivers flowed into the sea, forming a delta favorable to shelter a diverse vertebrate fauna. This sea was a part of late Sarmatian sea that occupied large areas". The artist reconstruction of this landscape by François Chevrier is given in Figure 2.

For the second aspect, this region is in the transition zone between the Mediterranean and Paratethyan marine realms, on the one hand, and at the crossroads between the major landmasses of the Old World, on the other. On the paleogeographic maps of late Miocene (Rögl 1998; Popov *et al.* 2004), this region is represented as a gulf on the southwestern part of the Paratethys or on the marine strait that connected Paratethys to Mediterranean. A detailed analysis of marine invertebrates and vertebrates from the Küçükçekmece area will certainly bring interesting results on their paleobiogeographic affinities.

Paleontology papers of the present volume are mainly devoted to the systematics of mammalian taxa found at Küçükçekmece. In addition, these studies provide much valuable information about the age, environment and affinities of this fauna. We are aware that there are still many other things to do, for instance its taphonomy, paleoenvironmental reconstruction, climatic significance, global paleobiogeographic affinities or the phylogeny of all the species. For that kind of analyses, and many others that 21th century paleontologists are doing to evidence the significance of a mammalian fauna in its context of time and space, we preferred to leave them for future studies. Our aim is to provide secure and up to date systematics of the Küçükçekmece mammals, because we believe that for more theoretical research, such as population dynamics, community structure, food preferences, effects of environmental and climatic constraints and so on, it is crucial to have up to date systematics. The fossils remain available to whomever wishes to undertake such analyses on this fauna, or to include them in regional studies. The papers in this volume provide all empirical knowledge on the Küçükçekmece mammals fauna for those who might wish to extend interpretaions about this fauna.

This work was made possible by the contribution of experienced scientific collaborators. I would like to sincerely thank all of this volume's contributors and acknowledge their professional skill in preparing their chapters. Their contributions serve as a landmark in understanding the scientific importance of the Küçükçekmece fauna. The referees of these chapter greatly improved our results by their expertise and valuable suggestions.

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REFERENCES

ARABU N. 1913. — Sur le Néogène du nord de la mer de Marmara. *Comptes rendus hebdomadaires des séances de l'Académie des Sciences* 157: 347-349.

ARABU N. 1916. — Études sur les formations tertiaires du bassin de la mer de Marmara : classification et parallélisme. *Comptes rendus hebdomadaires des séances de l'Académie des Sciences* 162: 332-334.

DE VERNEUIL E. 1837. — Notice géologique sur les environs de Constantinople. *Bulletin de la Société géologique de France* I, 8: 268-278.

LOM N., ÜLGEN S. C., SAKINÇ M. & ŞENGÖR A. M. C. 2016. — Geology and stratigraphy of Istanbul region, *in* SEN S. (ed.), Late Miocene mammal locality of Küçükçekmece, European Turkey. *Geodiversitas* 38 (2): 175-195 (this volume). http://dx.doi.org/10.5252/g2016n2a3

MALIK A. & NAFIZ H. 1933. — Vertébrés fossiles de Küçük Çekmece. *Bulletin de la Faculté des Sciences de l'Université d'Istanbul* 8: 1-119.

NICOLAS P. J. 1978. — Un nouveau gisement de Vertébrés dans le Chersonien: Kutchuk-Tchekmedje Ouest (Thrace turque). *Comptes rendus de l'Académie des Sciences de Paris* D 287: 455-458.

POPOV S. V., RÖGL F., ROZANOV A. Y., STEININGER F. F., SHCHERBA I. G. & KOVAC M. 2004. — Lithologic-paleogeographic maps of Paratethys. *Courier Forschungsinstitut Senckenberg* 250: 1-46.

RÖGL F. 1998. — Palaeogeographic considerations for Mediterranean and Paratethys seaways (Oligocene to Miocene). *Annalen des Naturhistorischen Museums in Wien* 99: 279-310.

SEN S. 2016. — Historical background, *in* SEN S. (ed.), Late Miocene mammal locality of Küçükçekmece, European Turkey. *Geodiversitas* 38 (2): 153-173 (this volume). http://dx.doi.org/10.5252/g2016n2a2

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