



Romanian Society of Paleontologists

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Foreword

The present volume of *Acta Palaeontologica Romaniae* groups some of the contributions to the 7th Romanian Symposium of Paleontology. The symposium was organised by the Romanian Society of Paleontologists together with the Department of Geology, Babeş-Bolyai University in the autumn of 2009, at Cluj. This volume is dedicated to Prof. Ovidiu Dragastan at his 70th anniversary. Professor Dragastan is a remarkable personality of Romanian paleontology; at the same time, he was the organiser of the first National Symposium of Paleontology (Bucharest, 1997) and the editor of the first issue of *Acta Palaeontologica Romaniae*. This initiative has been continued since then on a biennial basis, at Cluj, Iaşi and Bucharest; here we are now, closing the issue containing the contributions of its 7th edition.

The current volume contains 32 scientific contributions. All the papers have been submitted to peer-review for enhancing their quality. Most of the authors have updated their manuscripts based on the suggestions of the reviewers; however in some cases, the authors have taken the liberty to decline significant part of their major remarks. This, besides the original quality of the manuscripts, as well as our intention to publish all the submitted papers, with no exception, has finally led to certain heterogeneity throughout the volume. However, we consider that the current issue represents a faithful illustration of the present level reached by paleontological research in Romania.

At the end of this short preamble, we would like to express our special gratitude to our main sponsor, ROMGAZ S.A., who supported financially both the symposium, and the publication of this volume.

Cluj-Napoca, November 22, 2010

Prof. Dr. Ioan Bucur
Corresponding Member of Romanian Academy

PROFESSOR OVIDIU DRAGASTAN AT 70 YEARS

The period after the Second World War was extremely prolific for studies related to carbonate rocks, in direct correlation with the discovery of large reserves of hydrocarbons hosted by this type of reservoirs. Jean Cuvillier was the first to publish, at the beginning of the '60es, microfacies studies, while Erik Flügel has perfected this type of investigations by elaborating a new, complex methodology. In the 7th and 8th decades of 20th century numerous papers and some valuable monographs have been published focused on carbonate microfacies; several PhD theses were also dedicated to this topic.

In Romania, following a few sporadic approaches of regretted Dan Patruşiu, the beginning of systematic microfacies research is undoubtedly related to Professor Ovidiu Dragastan. The first step was represented by his doctoral thesis on the carbonate deposits of Upper Jurassic – Lower Cretaceous in Hăghimaş Mountains (the thesis was subsequently published as the first microfacies atlas in Romanian references). This was followed by more detailed studies on carbonate rocks, on larger stratigraphical intervals (from Paleozoic to Cenozoic, however the most important contributions being still related to Mesozoic), as well as on the investigated subjects (from micropaleontological studies on the carbonate shelf microfossils to synthetic works on the evolution of large areas of carbonate platforms and their integration in structural frameworks).

Nevertheless, the most important contributions of Professor Dragastan are still the ones resulting from his studies on calcareous algae. Practically, no fossil algae group was left behind in this enterprise: from dasycladaleans, to bryopsidaleans and charophytes within green algae, to corallinacean red algae and marine and freshwater cyanobacteria. Based on his studies on calcareous algae, Professor Dragastan was acknowledged as one of the experts in this field, worldwide. He is the author of numerous new species and genera of fossil calcareous algae (especially of cyanophytes and green algae) but also of new suprageneric taxa. Through his activity, Professor Dragastan has underpinned the study of calcareous rocks

in Romania; additionally to his personal valuable contributions, he has also provided a favourable environment for the approach of this type of studies by other researchers.

Personally, I consider myself as a disciple of Professor Dragastan. I benefited of his effective support at the beginning of my activity as a researcher; subsequently I was honoured to become his collaborator for several papers on calcareous algae. And I was not the only one: his numerous undergraduate students (when working at their diploma theses), Master students (dissertation theses) and PhD students (doctoral theses) have, on their turn, benefited of his vast knowledge and experience.

If at the beginning of the 7th decade of the last century, in Romania the knowledge on carbonate rocks was at least precarious, today there is a multitude of published data and an extended knowledge on limestone formations; with no doubt, the activity of Professor Dragastan has to be acknowledged as the greatest merit for this achievement.

The 70th anniversary represents, for each person, a time to summarize achievements; at the same time, it also represents a motivation for synthetic and monographic approaches. For Professor Dragastan this approach is not a new one: he has applied it already in the last years, and we are sure that he will not stop from doing this in the future.

Happy birthday, dear Mr. Professor with lots of good health, and with new achievements in scientific research!

**Prof. Dr. Ioan I. Bucur,
Corresponding member of Romanian Academy**

PROFESSOR OVIDIU N. DRAGASTAN: A CAREER IN GEOLOGY AND PALEONTOLOGY

Professor Ovidiu N. Dragastan was born in Bucharest in 1939, the same year the French Centre National de Recherche Scientifique (CNRS) was founded, raised and educated in Bucharest, in a city he witnessed in a troubled time interval for the whole Eastern Europe, that of the communist rule. To understand his career and his professional achievements, such a difficult time period has to be taken in consideration, when ideology, suspicion and reversed values ruled, and when human quality was quite a burden. Only after 1989 his achievements began to be acknowledged in his native country, and his place among valuable, senior Romanian geologists could be found. Certainly, it is very difficult, if not impossible, to outline such an outstanding career, but I think that a series of remarkable traits should be underlined about the career of Professor Ovidiu Dragastan. First, his contributions in fossil algae and carbonate microfacies were the result of a pioneering, deep scientific activity, in the pursuit of a profound passion for these fields, as they are witnessed by a long, substantial list of seminal publications. Secondly, he managed to organize and to express in publications such a scientific career in a hermetically sealed country, such as communist and later savagely stalinistic Romania was during the Ceausescu's regime, gaining an international status even before 1989, a rare performance for Romanian geologists. And last but not least, he loved teaching, and he always gave memorable courses and talks, as all of his students, me included, can easily acknowledge.

Professor Dragastan was a student of "Ion Neculce" highschool, and since 1957 an undergraduate and respectively a graduate student in 1962 of University of Bucharest in Geology (then Faculty of Geology and Geography, School of Geology). Professor Dragastan received his PhD title in 1971, with a thesis on Jurassic and Cretaceous calcareous algae from Bicaz Valley, in the Eastern Carpathians. He received his full professorship in 1993, as a recognition of his academic activity that encompassed all university levels, from Demonstrator (1962-1968), Assistant Professor (1968-1975), Lecturer (1975-1990), and Associate Professor (1990-1993). He retired in 2004, but today he continues his research activity as usual, in fields he soon became a classic: Paleoalgology and carbonate microfacies.

Professor Dragastan's scientific contributions are expressed in more than 140 research papers and 11 books, covering mainly fossil calcareous algae and carbonate microfacies, as well as Paleobotany and Paleozoology, published since 1963 until today. Actually, his first paper, on Jurassic and Cretaceous nannoplankton was published together with Acad. Miltiade Filipescu, mentor and supervisor for his early works. His interest was first drawn by Tintinids and nannoplankton but soon and without leaving these topics, his attention shifted to Jurassic and Cretaceous calcareous algae of the Romanian Carpathians. This is how his first contributions on fossil calcareous algae of Chlorophyta (Dasycladales, Bryopsidales), Rhodophyta and Charophyta (Charales) were produced, describing and defining key associations of such organisms for the Upper Jurassic – Lower

Cretaceous carbonate platforms of the Carpathians, Moesian Platform, Central and Southern Dobrogea. In the same time with his studies on the fossil calcareous algae, Professor Dragastan always kept an attentive look to carbonate microfacies, as a powerful tool for deciphering the reef environments and paleoecology of all structural units of Romania. He always correlated microfacies with biofacies, as undisputable tools for increasing the stratigraphic resolution and for paleoecological reconstructions. He also began to identify the lithostratigraphical and biostratigraphic units which will be refined during his later studies, for the special benefit of the oil, limestone and bauxite industry. All these fields of research were pioneered in Romania as well as abroad in that period of time. His early papers covered such topics in Apuseni Mountains, East Carpathians, South Carpathians and central Dobrogea, while the Moesian Platform followed quickly in investigations. Selected areas for his research were especially the Bicaz Gorges, the Haghimas Mountains, East Carpathians (subject for his PhD thesis defended in 1971 and published in English in 1975), Padurea Craiului (Apuseni Mountains), Bucegi (South Carpathians), and Central Dobrogea. Since the seventies, he began correlating carbonate platforms of Romania with those of Czech Republic and Slovakia, Spain, and Pakistan, as the Romanian carbonate platforms proved to be key sections for understanding the Tethyan paleobiogeography and evolution. As the number of research papers increased, and as their topics diversified, so was his national and international status, and by 1989, a fundamental year in Romanian recent history, Professor Dragastan had published already more than 75 research papers and books. Fortunately, until 1989 his papers were published predominantly in English and French, also in international periodicals, so their impact was substantial in his research fields, a rare ability and a rare outcome during those times of intellectual isolation and communist ideological pressure. His scientific productivity and his major contributions until 1989 should be understood in this precise historical and ideological context, in a country which would appear surrealistic and incomprehensible by today's social and democratic standards. Those were years of isolation, with short if inexistent literature exchange and access to mainstream scientific information. A positive role was played by the Alexander von Humboldt scholarship awarded yearly to Professor Ovidiu Dragastan between 1980-1990 with scientific help of Professor Erik Flugel from Erlangen University, enabling him to contact the western scientists and to become familiar with their science and with their literature. Apart of this scholarship, the scientific results of Professor Dragastan in such a difficult environment can only be explained by his dedication and abilities for the subjects he researched, keys for success in any intellectual environment and in any type of society.

After 1989, the career of Professor Dragastan took a natural and expected impetus, as the social and ideological barriers were lifted and a new Romanian

society was already on its own way. His contacts with the international researchers were intensified, as well as his abroad trips and collaborations. An important step was the Fulbright Scholarship awarded in 1993 by the US State Department, for researching fossil algae in Boston with Professor Stejtko Golubic. His American experience was continued later with new collaborations and projects, such as those with Dr. Diane S. Littler and Dr. Mark M. Littler (Smithsonian Institution, Washington DC and Fort Pierce, FL) on algae from Palau (Pacific Ocean), with Dr. Lwellya Hillis-Colinvaux (Woods Hole), Professor Paul Silva (Berkeley), among many others. Germany was also the place for fruitful collaborations with Professor Detlev Richter (Bochum University), Professor Jorg Trappe (Bonn University) and Professor H.G. Herbig (Köln University), Professor Felix Schlagintweit (München University), as well as Slovakia, with Professor Milan Misik (Comenius University) and with Dr. Jan Sotak (Slovakian Academy), Egypt, with Professor Hassan Soliman (Assiut University), Greece and Turkey, among many other countries. In all these countries, he undertook paleoalgal and microfacies studies, with significant publications regarding systematics, taxonomy, paleoecology and stratigraphy of fossil calcareous algae and microfacies environmental reconstructions. In 1997 and 2000 he introduced three new families, Pseudodoteaceae, Avrainvilleaceae and Rhipiliaceae, changing the status of the Mesozoic Porostromata algae, in peer-reviewed papers well received by the scientific community and recording a high number of citations.

His Romanian collaborators belong to universities of Bucharest, Iasi and Cluj-Napoca, as well as to research institutes, such as the Geological Institute of Romania. Professor Ioan Bucur, from Babes-Bolyai University was always a close collaborator in the field of microfacies and fossil calcareous algae, a true continuator of his work. Professor Theodor Neagu, member of the Romanian Academy, Professor Aurelia Barbulescu, Professor Ioana Pana are close collaborators and co-authors for an important monograph related to Central and Southern Dobrogea carbonates. Professor Justinian Petrescu, and Professor Razvan Givulescu, from Babes-Bolyai University in Cluj-Napoca, together with Professor Leonard Olaru,

from A.I. Cuza University in Iasi, were also close collaborators in various fields of Paleobotany, co-authoring both research papers and textbooks in Paleobotany. Professor Dragastan's contributions in mainstream Paleobotany are related mainly to plant compressions systematics and taxonomy, as well as to silicified plants.

Membership to highly significant professional organisations such as IOP and AAPG consolidated his status, as well as the prizes he received, such as the "Grigore Cobalcescu" Prize of the Romanian Academy. Lots of taxa are bearing today his name, as well as many taxa dedicated to him too. Undoubtedly, in Paleoalgal and carbonate microfacies, he succeeded to put Romania on the map and to receive international visibility and recognition.

Professor Dragastan enjoyed teaching, and I always remember his course in Paleobotany, as he would use not only up to date information, but teaching tools as well. In a time when the overhead projector was barely known, he managed to show us color slides with recent and fossil plants and algae. He taught a lot of disciplines, but his most beloved were always Paleobotany and Palynology. Today, although retired, he still gives a course in Microfacies and Biostratigraphy for graduates, for the great gain of his graduate students. His textbooks in Paleobotany, with Professor Justinian Petrescu, and in Palynology, with Professor Leonard Olaru and Professor Justinian Petrescu are still unequalled in Romanian language textbook landscape, and I only regret that the language barrier hindered their international acknowledgement they deserved.

For his 70th anniversary, I wish him a Happy Birthday!

Associate Professor Mihai E. Popa
University of Bucharest
Faculty and Geology & Geophysics
Department of Geology & Paleontology

LAUDATIO

UNIVERSITY PROFESSOR DOCTOR OVIDIU DRAGASTAN AT 70 YEARS

The 70th anniversary in the life of a university professor and researcher represents a threshold of scientific maturity and a solid basement for the assignment of the title of “senior” in the profession – in the case of Professor Dragastan, a career that was built with devotion and passion during 47 years.

Prof. Dragastan was born on February 22 February 1939 in Bucharest, where he has graduated the elementary and high school; between 1957–1962 he was a student of the Faculty of Geology and Geography, Section of Geology, of the University in Bucharest.

Given his remarkable skills as a student, firstly his passion for research and learning, after his university graduation he was invited to join the faculty, as trainer (1962) in the Chair of Paleontology and Stratigraphy of the same faculty. It was in this department that Prof. Dragastan performed afterwards his teaching and scientific activity, including today.

He has gradually occupied all the academic positions, which he has honoured with special teaching and scientific results; all these lead to the assignment, in 1993, of the title of **University professor**. Starting with 2004 he is **Consulting Professor (retired)**.

In 1971 Prof. Dragastan has defended his PhD thesis on “**Upper Jurassic and Lower Cretaceous Microfacies from Bicaz Valley Basin**”, under the co-ordination of **Acad. Prof. dr. Miltiade G. Filipescu**, his scientific mentor, finalized with the acceptance of the title of “**PhD in geology**”.

The thesis published in 1975, in English, in volume **XXI of the series “Memorii” (Memoirs) published by the Geological Institute of Romania**, brought significant stratigraphical contributions concerning the Upper Jurassic–Upper Cretaceous carbonate deposits from the Bicaz Valley Basin, by the study of microfacies types and by the establishment of characteristic biozones based on dasycladalean algae and benthic and planktonic foraminifers, the latter being rare forms. The biozones established in this thesis provided new opportunities for regional correlations with other carbonate platforms, such as those from the Romanian Carpathians, Dinarides, Apennines, and Northern Calcareous Alps.

In parallel with his scientific activity, he performed **academic didactic activity**, starting with the first level, that of trainer, according to the old Romanian academic tradition; he achieved his “teaching training” under the co-ordination of **Acad. Prof. dr. Miltiade G. Filipescu**, who mentored him both didactically and scientifically. Among the disciplines that were taught by Prof. Dragastan, some following training stages abroad, we can mention: **Paleobotanics, Palynology, Paleoecology and paleoenvironments, Elements of geology and paleontology, Stratigraphy and Reconstruction of paleoenvironments**.

In order to allow a more detailed understanding and for scientific documentation in these topics, Prof. Dragastan has published – as single author or in collaboration, 11 books at different printing houses, among which we can mention: **Paleobotanică și Palinologie** (“Paleobotanics and Palynology”, multiplied, University of Bucharest, ,

1975); **Palinologie - cu aplicații în geologie** – (“Palynology - applied to Geology”), in collaboration with Prof. dr. Iustinian Petrescu from Babeș-Bolyai University Cluj-Napoca and Prof. dr. Leonard Olaru from Al. I. Cuza University Iași (Editura Didactică și Pedagogică, Bucharest, 1980); **Alge calcareoase din Mesozoic și Terțiarul României** (“Calcareous algae from the Mesozoic and Tertiary of Romania”, Editura Academiei Române, 1980); **Plante fosile** (“Fossil plants”) - in collaboration with Prof. dr. Iustinian Petrescu (Editura Dacia Cluj – Napoca, 1981); the chapters of **Paleontologie** (“Paleontology”) (1984) and **Biogeochimie** (“Biogeochemistry”) (1985) of Manualul Inginerului de Mine (“Treatise for Mining Engineers”), Editura Tehnică; **Jurasicul și Cretacicul din Dobrogea Centrală și de Sud (Paleontologie și Stratigrafie)** [“Jurassic and Cretaceous of Central and South Dobrogea (Paleontology and Stratigraphy)”] in collaboration with Acad. Prof. dr. Theodor Neagu, Prof. dr. Aurelia Bărbulescu and Prof. dr. Ioana Pană (Editura Supergraph, Cluj – Napoca, 1998), as well as **Miocene to Holocene calcareous algae of the Caribbean area** (Editura Cartea Universitară, București, 2007).

Additionally we can mention the scientific invited talks of Professor Ovidiu Dragastan at Ruhr University in Bochum (2000–2003) and Köln University (2004–2005), Germany.

His scientific activity - an essential component in the profile of a genuine university professor - was remarkably interrelated to his teaching interests. From the beginning, Professor Ovidiu Dragastan was interested in studying important and up-to-date fields of geology, which he continues to approach still today. Among these, one can include: **Microfacies, Carbonate platforms, Biostratigraphy** (Upper Paleozoic–Mesozoic–Cenozoic), **Reconstruction of paleoenvironments, Paleobotanics and Environmental geology**.

Related to these topics, Prof. Dragastan took part to several training stages at various institutions among which: Germany, as a grantee of Alexander von Humboldt Foundation, 1980–1990; at Ruhr University in Bochum, 2003–2003 and 2006, 2007, and recently in 2009; Köln University, 2004 – 2005, in USA through Fulbright Senior Awards, 1993–1994 at Boston University, and then at Berkeley University, 2001; at the Smithsonian Institution- Washington 2002 -2003, at Fort Pierce (Florida), 2003 and Smithsonian- Balboa, Panama, 2002.

The results of his research in these major areas of interest were published in 145 articles and studies, in Romania and abroad, among which 43 ISI-cited, and 11 books and treatises, among which some were already mentioned. Directly or via international collaborations, the 45 years of scientific activity of Professor Dragastan have contributed to the development of several new research trends in Romania, with theoretical or practical impact.

These trends concern the following: - Mesozoic

and Cenozoic microfacies and carbonate platforms, - **Lithostratigraphical analysis and definition of new formations in the carbonate units of Romanian Carpathians, Moesian Platform and the Romanian shelf of Black Sea**, with an emphasis on reservoir rocks and the mother rocks for hydrocarbons, as well as the types of traps, **Biostratigraphy**, with an emphasis on **evidencing the main biozones in Mesozoic deposits and their use for correlating the carbonate platforms in the Romanian Carpathians, Moesian Platform, Northern Calcareous Alps, Apennines and Dinarides**.

Another area that Prof. Dragastan has developed is **Paleoalgology**, resulting in the description of 3 new families, 36 genera and 260 species new for science of Mesozoic and Cenozoic calcareous algae.

His contributions to **Paleobotanics**, summarized by the description of taxa of various flora represented by fossil leaves and wood, with insight on the phytostратigraphy of Upper Paleozoic, Jurassic or Upper Cretaceous deposits, from Reșița–Moldova Nouă area, Codlea (Southern Carpathians), in collaboration with Conf. dr. Mihai Popa, then from Central Dobrogea (Middle Jurassic flora), in collaboration with Prof. dr. Aurelia Bărbulescu, as well as from Northern Dobrogea (the flora from Babadag Basin), in collaboration with Prof. dr. doc Răzvan Givulescu and Acad. Th. Neagu.

Paleoenvironment reconstructions for Mesozoic carbonate platforms in the Alpine-Carpathian area, as well as studies and research work on **Environmental protection** concerning the impact of mining works for bauxite ores in the Apuseni Mountains and designing new methods for rehabilitation of the mining areas were other of his significant research trends.

It is worthy to mention that several scientific papers were published as a result of international collaborations in the frame of Alexander von Humboldt Foundation, DAAD at Ruhr Universität Bochum, University of Köln, Freie Universität in Berlin (Germany), as well as of Fulbright Foundation and Smithsonian Institution, Washington, Fort Pierce, Florida and Balboa, Panama, to which we can add Berkeley University, Boston University and Miami University (USA).

As a result of individual studies or of international collaborations, by promoting new research directions and specialisations in Romania, we can underline the following main achievements of Professor Ovidiu Dragastan:

- Study of Upper Jurassic and Lower Cretaceous calcareous microfacies in Bicaz Valley Basin and reconsidering the ammonite, corals, sponges, gastropods and bivalves faunal associations, as well as microfloral – especially calcareous algae, and benthonic and planktonic foraminifers associations;
- Synthetic studies on Mesozoic algae from Romania, Germany, Turkey, Greece, Slovakia, Caribbean area (USA), Pakistan, Egypt and Morocco;
- Research on stratigraphy of bauxite deposits from the Northern Apuseni mountains, as well as environmental protection and mining areas rehabilitation;
- Lithostratigraphy and biostratigraphy of Jurassic and Lower Cretaceous deposits from the carbonate platforms of Romanian Carpathians, as well as of the deposits on the Romanian Black Sea shelf area;
- Of taxonomic and systematic importance is the description of three new for science calcareous algae

families: **Pseudoudoteaceae**, **Avrainvilleaceae** and **Rhipiliaceae**;

A series of significant international contributions is related to the study of non-marine carbonate facies at the Jurassic–Cretaceous limit in Weserbergland area, NW Germany and from the Western Carpathians, Slovakia, as well as the study of calcareous algae associations from Palau Archipelagos (Western Pacific), or those from Key Largo and Miami (Florida) limestones, in collaboration with experts from Smithsonian Institution and University of Miami, Florida (USA).

As part of his scientific research, Professor Dragastan was involved in an impressive number of scientific internal and international contracts and grants (in some of them as project director) under the umbrella of the Romanian Academy, of CNCSIS-Romania, Ruhr Uni-Bochum, Smithsonian Institution and University of Miami.

Professor Dragastan was one of the **organisers of the 1st National Symposium of Paleontology in Romania, in 1997**, which took place at the Faculty of Geology and Geophysics of the University of Bucharest, organised by the Society of Paleontologists from Romania. He was also **the editor of the first Romanian paleontology issue - of the journal Acta Palaeontologica Romaniae**, today a publication of international recognition, currently publishing its 7th issue.

At the same time, Professor Dragastan has took part at numerous national and international scientific reunions, symposia and congresses (**Capri, 1991 Chairman**; Vienna, 1992, New Orleans, 1993; Denver, 1994; Rio de Janeiro, 2001; Athens, 2007), being elected at some of these meetings as **Chairman** or **Scientific Judge**. He is member of some international research groups (Mesozoic biostratigraphy from Alpine carbonate areas), and member of some national and international scientific associations, such as: Society of Paleontologists of Romania, International Organization of Paleobotany, London, Geological Society of France, American Association of Petroleum Geologists, Tulsa, Oklahoma, USA, American Association for Advancement of Sciences, USA, as well as Alumni Humboldt Foundation, Germany. In recognition for his scientific results, Prof. Dragastan has been awarded several important **diplomas and distinctions**, among which: **“Grigore Cobălcescu” Prize of the Romanian Academy** (1983); **Honorary Diploma of the AAPG (USA)**; **“Emil Pop” Prize of the Society of Paleontologists of Romania** (2007); **Honorary Diplome of the Rectorate of the University of Bucharest** (2008) **for international cooperation and research, published in Micropaleontology, New York – ISI acknowledged, in collaboration with Prof. dr. Hans Georg-Herbig from Köln University**.

Currently, Professor Dragastan co-ordinates four PhD thesis. He plays an important role in creating the Collection of fossil calcareous algae, microfacies and microflora, consisting of 3,000 thin sections; the collections also preserves the holotypes of the 36 genera and 260 species new for science described from Babadag Basin, Central Dobrogea and Southern Dobrogea, as well as from other areas in the Romanian Carpathians, or other areas from Europe, Asia or

Caribbean (USA).

Besides these remarkable didactic and scientific results, Professor Dragastan has also been involved in **managerial tasks**, being Head of Department between 1996–2004 and Director of research in the topic Microfacies and geological environment protection.

At the celebration of seven decades of life and activity of our colleague, **Professor dr. Ovidiu Dragastan**, at the time when his whole activity is summed up, we can firmly state that he is an outstanding scientific researcher, with impressive didactic and scientific achievements, a symbol of professional devotion and one of the most notable

experts of the Romanian School of Paleontology.

On this occasion we wish him good health and strength to continue his deed, in order to finalise his work as researcher and investigator of life tracks still unrevealed by the Romanian underground, through the same hard, detailed but full of beauty scientific labor.

Professor Dr. Emeritus Leonard Olaru
Department of Geology
Al. I. Cuza University Iași

REPLY OF PROFESSOR OVIDIU DRAGASTAN



PROFESSOR OVIDIU DRAGASTAN

Dear Professor Agachi, Dear colleagues, Dear students, Ladies and Gentlemen,

First of all, I wish to thank you very much for your kind words, the appreciations about my educational and scientific activities, also my achievements with the occasion of my 70 th anniversary.

In the same way, I wish to thank for the Laudatio my colleague and friend Emeritus Professor Dr. **Leonard Olaru**, a renowned palynologist from Alexandru-Ioan Cuza University of Iași, for his kind considerations and appreciations regarding myself.

I thank my colleague Professor Dr. **Ioan I. Bucur** from Babeș-Bolyai University in Cluj -Napoca for successfully organizing, together with his young team of collaborators, two International Symposia of Romanian Paleontology.

Professor Bucur has worked together with me in the field of calcareous algae, we co-authored several papers on fossil algae, some of them including descriptions of new species ranging from Late Jurassic to Early Cretaceous of the Carpathians.

My colleague is now a highly appreciated expert in the scientific world of paleoalgology, micropaleontology and microfacies.

I also thank my younger colleague Associate Professor **Mihai E. Popa** from our Department of Geology and Paleontology, Faculty of Geology and Geophysics,

University of Bucharest, for his words and presentation concerning my activities. I always considered him as my disciple. He has been very active in organizing, up to now, two international meetings on Paleozoic and Mesozoic floras, being also deeply involved in significant projects dealing with Paleobotany, Palynology and Environmental Sciences.

Before I finish my replica to the presentations of my colleagues, I want to recall some important steps that have influenced my educational and scientific career.

During my activity spanning over 47 years, I was „lucky” in meeting genuine, great personalities in my field of research. These personalities had directly influenced me in discovering my path in science, finding directions and helping to apply new methods of investigations in the field of Paleontology and Sedimentary Geology. With this occasion, here and now, I present my homage and my gratitude to all of them. My first step dates back to 1963, as a beginner in the field of study on limestones of the Romanian Carpathians, together and under the supervision of my PhD co-ordinator, Academician Professor **Miltiade Filipescu (Photo 1)**, at that time Chief of the Chair of Paleontology and Stratigraphy, Vice-Rector of the University of Bucharest and also Director of the Geological Institute of Romania.

Professor Filipescu introduced me to the study of marine calcareous microplankton (calpionellids and nannoplankton, genus *Nannoconus*), giving me the opportunity to meet Professor **Jean Cuvillier (Photo 2)** and to obtain his paper published in 1951 *Étude et utilisation rationnelle de microfacies*, in *Revue de Micropaléontologie*, 4/1, p.112-118, Paris.



Prof. Miltiade G. Filipescu

Photo 1 - Prof. Miltiade G. Filipescu



Photo 2 - Prof. Jean Cuvillier



Photo 3 - Prof. Erik Flügel

He also introduced me to the work of Professor **Michel Durand-Delga**, father of genus *Crassicollaria* - a genus with many species, who also described the stratigraphic value of calpionellids biozones from the Jurassic-Cretaceous boundary. Professor Filipescu acquainted me also to Professor **Marcel Lemoine**, a tectonician visiting the Geological Institute of Romania, in Bucharest. The last two were my tutors for becoming a member of the Société géologique de France, but only for 1969-1970, as at the time, I had no possibility to pay my dues to continue remaining a member of this professional organization.

The second important step forward in my scientific career was provided by a field trip organized in 1978, when crossing the Romanian Carpathians with a group of undergraduate students and geologists from Erlangen University (Germany) lead by **Professor Erik Flügel (Photo 3)** and his team including Professors Zeiss and Groiss.

On this occasion I have met Professor Flügel, a remarkable personality and a high profile geologist, editor of famous scientific journals such as *Facies*, who also published two essential books on Microfacies and Limestones: *Mikrofazielle Untersuchungs- methoden von Kalken*, 1978, 454 p., Springer Verlag and *Microfacies of Carbonate Rocks*, 2004, 976 p., Springer Verlag. In *Facies* (Vol. 4, 1981), I have published a synthesis paper entitled *Mesozoic Dasycladaceae from Romania, distribution and biostratigraphical importance*, a paper launching me in the field of calcareous algae and microfacies. I am indebt to Professor Flügel for his confidential recommendation for obtaining a Humboldt scholarship in 1980; I acknowledge his support a lot, and I always remember meeting him, his family and his collaborators in Erlangen.

Starting with 1981, until today I was involved in many international projects dealing with Mesozoic carbonatic deposits, with emphasis on their micropaleontological content (Jurassic - Early Cretaceous algae, foraminifera, microproblematics). I was involved in such projects with Professor **Hans Mensink** and his collaborators, Professor Dorothee Mertmann and Dr. Eleonore Juber, from the Bochum University. I wish to recall the collaboration with Professor **Jörg Trappe** (Bonn University) regarding the Sinemurian algae of North-East Iberian Chain (Spain), a project finalized in 1986, the one with Professor **Hans-Georg Herbig** (Köln University), with whom I have published two papers on species of the *Halimeda* Group (2005, 2007) from the Paleogene of Central High Atlas (Morocco) and with Emeritus Professor **Milan Misik**, of Jan Comenius University (Bratislava) as well as with Dr. Jan Sotak, of the Slovak Academy. Together with the latter I have published *Non-marine calcareous Lower Cretaceous algae and Cyanobacteria from Czorsztyn Unit, Western Carpathians* (2001) and *Calcareous algae of the limestone pebbles from conglomerates of Western Carpathians* (2008).

Also, I have cooperated with Professor **Musa Kazim Düzbastillar**, of Izmir University, Professors **Diakantoni**, **Fotini Pomoni** and **Evanghelos Velitzelos**, of Athens University, as well as with Professor **Hassan Soliman**, of Assiut University, with whom I have published a paper in Micropaleontology, *Palaeogene calcareous algae of Egypt*, 2002, New York.



Photo 4 - Dr. Diane S. Littler and Dr. Mark M. Littler (at Smithsonian, Fort Pierce, Florida).

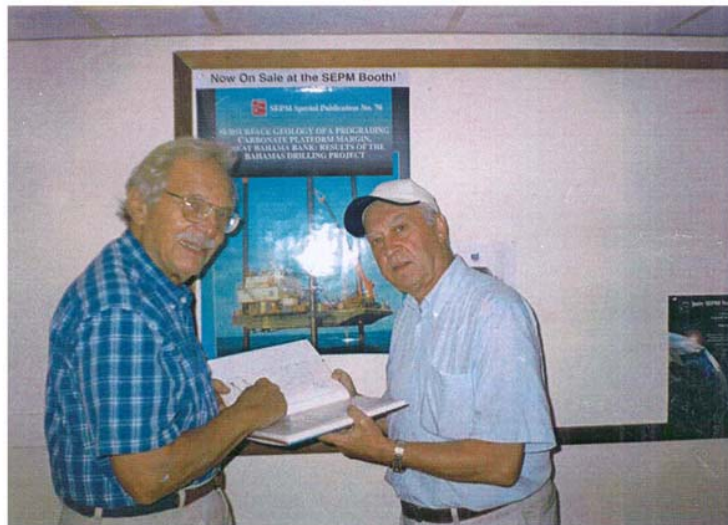


Photo 5 - Prof. Robert N. Ginsburg together with Prof. Ovidiu N. Dragastan.

In USA during my Fulbright Scholar Award (1993-1994), I had the privilege to collaborate with Professor **Stejtko Golubic** from Boston University, a well known personality in the field of Cyanobacteria and shallow marine microbialites. We published in 1996, also in collaboration with Professor **Detlev K. Richter** (Bochum) a paper entitled *Rivularia haematites, a case of Recent versus Fossil morphology, taxonomical considerations*. During my visit in North America, I have met two other personalities, Dr. **L. Hillis-Colinvaux**, owner of an impressive collection including Recent *Halimeda* of all reef-marine realms, and Professor **Paul Colinvaux**, a high profile ecologist and a tropical rainforest researcher. Together with Dr. L. Hillis-Colinvaux I have visited the

Smithsonian Institution in Balboa, Panama, and we have collected numerous calcareous algae from reefs occurring along the Atlantic coast.

When visiting Washington DC in 2000, I have met two high profile researchers in algae and reef ecosystems, from the Smithsonian Institution, Dr. **Diane S. Littler** and **Mark M. Littler (Photo 4)**.

This encounter gave me the opportunity to gain two more scholarships at the Smithsonian, in 2002 and 2003. During my first scholarship there, I worked on the **Harlan J. Johnson** collection. This collection, donated by one of the greatest American paleoalgologists, includes thin sections obtained from various drillings in the Pacific islands. During my second scholarship I

worked in Florida, at Fort Pierce Station of the Smithsonian, on samples collected from Pliocene–Pleistocene limestones of the Key West Peninsula, publishing with the two Littlers two papers regarding the carbonatic facies and the role of the calcareous algae in reef ecosystems. During a visit to the University of Miami, I was introduced to Professor **Robert G. Ginsburg (Photo 5)**, a great personality in the field of carbonate deposits, who offered me for study the cores of Clino and Unda drills, from the Bahamas carbonate platform.

The results of the study of these thin sections were published in 2007, in *Analele Universității din București, Seria Geologie, Special Publication No.2*, for which I received the Emil Pop Prize of the Society of Romanian Paleontologists. I wish to thank Professor Ginsburg for his hospitality and his trust in offering me the cores and the thin sections from these very important drillings.

In this context I wish to remind Professor **Paul C. Silva (Photo 6)**, from the Berkeley University, a great personality in the difficult field of taxonomy and systematics.



Photo 6 - Prof. Paul C. Silva

I learned from him "the rule" and the special conditions for defining a new species or a new genus, in the field of Phytoecology and in that of Paleopalaeontology. Recently, in his work *Historical Review of Attempts to Decrease Subjectivity in Species Identification, with Particular Regard to Algae*, Protist vol.159 (2008), Prof. Silva recommends to reduce the subjectivity for correctly identifying or revising a taxon by a group of researchers. Such an analysis must be admitted only if it includes a correct revision of the original illustrations, to which he adds that „ the genomic analysis is a very important tool, but its application should not be assumed to be free of

subjectivity". I wish to thank him for his suggestions and very useful comments for some of the papers in work, and especially for his honouring recommendations written for my funding applications; such "heavy" recommendations have increased my chances in the tough competition for research grants.

Another fruitful and long collaboration is the one with Professor **Detlev K. Richter (Photo 7)** from the Bochum University. This collaboration started after 1992 and it continues today, almost without interruption. I consider this collaboration as extremely fruitful, leading to the publication of more than 12 papers, together with him and with his collaborators, especially with his PhD students (Dr. **Gielisch**, Dr. **Kaziur**, Dr. **Kube**, Dr. **Radusch**, Dr. **Beck** and Dr. **Zuhl**).



Photo 7 - Prof. Detlev K. Richter

Professor Richter was the leader of a group of graduate and undergraduate students from Bochum University who visited Romania during the summer of 1996, in a field trip through the Romanian Carpathians and Dobrogea. This fieldtrip that lasted 25 wonderful days was led by a Romanian team consisting of myself, Associate Professor **Mihai E. Popa** and Geologist **Ioan Coconu**. I consider this scientific collaboration both a tribute and a friendly appreciation of Professor Richter, an important researcher in the fields of marine, brackish or freshwater carbonates and speleothemes.

I have also collaborated with a team from University of Leoben (Austria), represented by Professor **H.J. Gawlick**, and Dr. **Felix Schlagintweit**, resulted in the publication of two common research papers during a very fruitful and promising collaboration.

I am also grateful to **Louis C. Bortz**, exploration geologist with Pan American-Amoco in Denver between 1959-1986, currently an independent expert working with different companies. I owe him financial support for some of the research projects, for publishing of various papers such as *Miocene to Holocene calcareous algae of the Caribbean area* (2007), and for helping me becoming an Active Member of the American Association of Petroleum Geologists (AAPG) from 1990 until today.

Also, I cooperated with many Romanian scientists: Professor **Aurelia Bărbulescu**, Professor **Ioana Pană**, working with them under the leadership of Professor **Theodor Neagu**, member of the Romanian Academy, publishing together the monograph: *Jurassicul și*

Cretacicul din Dobrogea Centrală și de Sud- Paleontologie și Stratigrafie (1998), a work which took us more than 10 years of research on Jurassic and Cretaceous deposits from Central and South Dobrogea. This monograph was on high demand also abroad, in Germany, Italy or Poland, being considered an essential contribution to the understanding of the lithostratigraphy and especially of the biostratigraphy of these deposits. The study includes 54 plates illustrating the main fossil groups of these important units belonging to the Moesian Platform. A constant collaboration involved my younger colleagues from the Chair of Geology and Paleontology, with whom I have published research papers in the frame of various international (EU) and national (CNCSIS – NURC) research grants: Associate Professor **Iulia Lazăr**, Associate Professor **Răzvan Damian**, Associate Professor **Mihai E. Popa**, Associate Professor **Marius Stoica** and Associate Professor **Zoltan Csiki**.

I also would like to recall with sincere regrets the personalities of two high profile researchers and professors in the fields of Geology, Paleobotany and

Palynology: the late Professor **Răzvan Givulescu**, Honorary member of the Romanian Academy, and the late Professor **Justinian Petrescu** from Babeș-Bolyai University Cluj-Napoca. To them I address my homage, and I express my faith that they will never be forgotten by the young generations.

I wish to thank all the participants to this symposium, with the hope that we will meet again in similar meetings organized by the Society of Romanian Paleontologists; I also wish that Acta Palaeontologica Romaniae will survive any crisis.

I thank the organizers, and all fellow participants to this meeting, which was so well organized by our colleagues from Babeș-Bolyai University in Cluj-Napoca, Transylvania.

Finally, I will just add my motto: *I love limestones, calcareous algae and fossils*.

Cluj-Napoca, October 22, 2009.

LUCRĂRI ȘTIINȚIFICE ȘI CĂRȚI ALE PROFESORULUI OVIDIU DRAGASTAN (SCIENTIFIC PAPERS AND BOOKS)

1963 - 1970

1. Asupra prezenței unor depozite cu *Nannoconus* în sedimentele jurasico-cretacice din R.P. România (On the presence of some deposits with *Nannoconus* in Jurassic-Cretaceous sediments from R.P. Romania). Studii și cercetări de geologie ale Acad. R.P.R., no. 2/1963, p. 185-193, 2 fig. București (in co-operation with Acad. M.G. Filipescu).
2. Sur la présence de certains dépôts *Nannoconus* dans les sédiments Jurassico-Crétacées de la République Populaire Roumaine. Revue roumaine de géologie et géographie de l'Acad. R.P.R. t. 7/2, 1963, p. 191-197, 2 fig. București.
3. Resturi de Tintinnide în depozitele tithonice și neocomiene din R.P. Română (Tintinnide remnants in Tithonian and Neocomian deposits from R.P. Romania). Studii și cercet. de geologie ale Acad. R.P.R., t. 7/3, 1963, p. 333-356, 1 fig., 2 tab., 5 pl., București (in co-operation with Acad. M.G. Filipescu).
4. *Saccocoma* și *Globochaete alpina* în microfaciesul jurasicului superior din Bucegi și Banat (Saccocoma and Globochaete alpina in the Upper-Jurassic microfacies from Bucegi and Banat), Analele Universității București, Seria Geologie, nr. 2, 1964, p. 95-107, 5 pl., București.
5. Restes de Tintinnides dans les dépôts tithonique et neocomiens de la République Populaire Roumaine, Recueil en l'honneur de l'Acad. Smilo Iovtchev, p. 247-261, 3 tab., Sofia (en collaboration avec Acad. M.G. Filipescu); 1964, Sofia.
6. Stratigraphic and paleontological considerations upon Tintinnids in some Jurassic and Cretaceous deposits of Romania. Proceed of section 8, XXII Inter. Geological Congress, p. 428-437, 1 fig., 5 tab., 1 pl., 1964, India (in co-operation with Acad. M.G. Filipescu), Lucknow.
7. Micrographic study of limay-marls from the Sinaia Beds (Eastern Carpathians), Carpatho-Balkan Geological Assoc. VIII Congress, p. 61-85, 3 fig., 1965, Sofia (in co-operation with C. Vinogradov).
8. A new Serpulid species in the Upper Jurassic of Romania, Paläont. Zeitschrift, 40, p. 147-150, 3 fig., 1966, Stuttgart, ISI - 0.333
9. Microfaciesurile jurasicului superior și cretacicului inferior din Munții Apuseni (Upper Jurassic and Lower Cretaceous microfacies from the Apuseni Mountains - Western Carpathians), Analele Univ. București, Seria Geologie, 15/2, p. 37-47, 3 fig., 5 pl., 1966, București.
10. Etude du niveau à Charophytes d'âge Crétacé inférieur des Monts Apuseni (Roumanie), Revue de Micropaleontologie, nr. 1, p. 23-28, 2 pl., 1966, Paris (en collaboration avec D. Istocescu et M. Diaconu),.
11. Données sur les microfaciès du Jurassique supérieur et du Crétacé inférieur de la région des Gorges de Bicaz (Cheile Bicazului), Revue de Micropaleontologie, 11, p. 71-76, 2 fig., 2 pl., 1966, Paris-
12. Alge calcareose în jurasicul superior și cretacicul inferior din Munții Apuseni (Calcareous Algae in the Upper Jurassic and Lower Cretaceous from the Apuseni Mountains - Romania), Studii și cercet. de geol. ale Acad. R.S. România, 12/2, p. 441-454, 8 pl., 1967, București
13. Algues calcaires du Mésozoïque de Roumanie et leur importance stratigraphique, Association Carpatho-Balkan. VIII Congress, p. 509-517, 1 fig., 1967, Belgrad.
14. Algues calcaires dans le Jurassique supérieur de Roumanie, Geologica Romana, VII, p. 59-73, 3 pl., 1968, Roma.
15. Sedimentological study of the Upper Jurassic sequence of limestones in the Pui Zone (Romania), Sedimentary Geology, 2, p. 291-304, 2 fig., 3 pl., 1968, Amsterdam (in co-operation with Al. Stîllă and I. Dumitru), ISI. 1.444
16. Triassic calcareous algae from the Apuseni Mountains (Romania), Rev. of Paleobotany and Palynology, p. 63-101, 10 pl., 1969, Amsterdam (in co-operation with M. Diaconu).

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18. Algues calcaires du Jurassique supérieur et du Crétacé inférieur de Roumanie, Revue de Micropaleontologie, 1, p. 53-62, 3 pl., 1969, Paris.
19. New species of Dasycladaceae (calcareous algae) in the Lower Cretaceous of the Eastern Carpathians (Romania), Rev. of Paleobotany and Palynology, p. 117-129, 3 fig., 3 tab., 2 pl., 1970, Amsterdam.
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1971 - 1980

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24. New Algae in the Upper Jurassic and Lower Cretaceous in the Bicz Valley, Eastern Carpathians (Romania), Revista Espanola de Micropaleontologia, Vol.3/2, p. 155-192, /1971, Madrid.
25. Considerații stratigrafice asupra faciesului carbonat recifal din zona Pui (Carpații Meridionali)-(Stratigraphic considerations upon the carbonate reef facies from the Pui zone (southern Carpathians - Romania), Dări de seamă ale ședințelor Inst. Geologic, p. 124-129, LVIII, 1972, 2 fig., 3 pl., București (in co-operation with Al. Stîllă and I. Dumitru)
26. Cretacul inferior din Dobrogea de nord (The Lower Cretaceous from Northern Dobrogea - Romania), Studii și cercetări de geologie ale Acad. R.S. România, 17/1, p. 77-85, 1 fig., 4 pl., București (in co-operation with V. Mutihac and A. Lăcătușu)
27. Asupra unor lemne de *Icacinoxylon* Shilkina din oligocenul de la Telega (Prahova) (Upon some *Icacinoxylon* shilkina woods in the Oligocene from Telega (Prahova-Romania), Studii și cercetări de geologie ale Acad. R.S. România, 17/2, p. 445-451, 3 fig., 1972, București (in co-operation with J. Petrescu)
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31. Zonele microfatale și limita Jurassic-Cretacic în Carpații Orientali (Masivul Hăghimaș) și Platforma Moesică (Microfacial zones and the Jurassic-Cretaceous boundary in the Eastern Carpathians (Hăghimaș Massif) and the Moesic Platform - Romania), Studii și cercet. de geol. ale Acad. R.S.R., 18/2, p. 509-533, 8 fig., 1973, București (in co-operation with R. Muțiu and C. Vinogradov).
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33. Upper Jurassic and Lower Cretaceous microfacies from the Bicz Valley Basin - East Carpathians (Romania). Memori, vol. XXI, 89 p., 110 pl., 10 tab., Institutul de Geologie și Geofizică - Ph. D. thesis, 1975, București
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35. Asupra unor alge, foraminifere, sfinctozoare și microproblematică din triasicul din Carpații Orientali și Dobrogea de Nord (Upon some Algae, Foraminifera, Sphinctozoans and Microproblematicae in the Triassic of Eastern Carpathians and Northern Dobrogea - Romania). Studii și cercet. de geol. ale Acad. R.S.R., 20, p. 247-254, 2 fig., 6 pl., 1975, București (in co-operation with E. Grădinaru)
36. Microfacies du Malm et du Crétacé inférieur de la région des Gorges de Bicz (Roumanie), Guide to the 14th European Micropaleontological Colloquium, p. 123-128, 2 tab., 1 map., 1975, București
37. Sur le contenu micropaléontologique des Couches de Sinaia. Guide to the 14th European Micropaleontological Colloquium, p. 183-184, 1975, București
38. Microfacial study of the Upper Jurassic and Lower Cretaceous deposits from the central part of the Moesic Platform (Romania), Revue roumaine Géol., Géophys. et Géogr., Géologie, t. 19, p. 105-118, 6 fig., 1975, București (in co-operation with C. Vinogradov)
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42. *Munieria grambasti* Bystricky în senonianul de la Cornițel (Bazinul Borod) (*Munieria grambasti* Bystricky in the Senonian from Cornițel (Borod Basin - Romania)), Dări de seamă ale ședințelor Inst. Geol. și Geof., LXIV, p. 341-346, 2 pl., 1978, București.
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1981 - 1990

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51. Lower Cretaceous marine algae and calcipionellids from Candas (San Pedro), Asturias Province (Spain), *Cuadernos Geologica Iberica*, vol. 8., p. 125-143, 1982, Madrid
52. Biostratigraphy of the Triassic formations in the east of the Pădurea Craiului Mountains (Romania), Dări de seamă ale ședințelor Inst. Geol. și Geof., LVII, 4, p. 29-61, 1982, București (in co-operation with M. Diaconu și Elena Popa).
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54. Practical potentialities of Palaeontology, 75 years Lab. of Paleontology, Special volume, Editor Neagu Th., p. 15-22, 1983, București
55. Stratigrafia depozitelor neojurassice și eocretacice din Dobrogea de Sud (Stratigraphy of the Neojurassic and Eocretaceous deposits from Southern Dobrogea - Romania), *St. cerc. geol., geof., geogr.*, 29, p. 80-87, 1984, București (in co-operation with Th. Neagu)
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RECORDS OF TAPIROIDEA GRAY 1825 (MAMMALIA, PERISSODACTYLA) FROM KAZAKHSTAN – AN OVERVIEW

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Abstract. Kazakhstan is rich in deposits that have brought to light an extremely rich collection of ancient fossil remains dated from the Paleocene up to the Pleistocene (becoming richer especially starting with the Oligocene).

The peak of the Tapiroidea development occurred during the Eocene.

Systematic studies on Tapiroidea in Kazakhstan were initiated in 1918 by Borissyak.

Until to-day, five of the six Tapiroidea families (Tapiridae GRAY 1821, Lophialetidae MATTHEW & GRANGER 1925, Deperetellidae RADINSKY 1965, Helaletidae OSBORN 1892, and Isectolophidae PETERSON 1919) have been identified in this area.

The “Obaylinskaya” fauna (“Obaylian” fauna) recovered in Obayla river deposits (Zaysan basin, Eastern Kazakhstan) represents the oldest fossil mammalian complex recovered from the territory of the former Soviet Union.

Works carried out between 1993-1995 in the Zaysan basin by a Kazakh-American scientific team increased the previous knowledge on Tapiroidea in this region.

Apart from Kazakhstan, tapiroid remains were found only in a few other localities in the rest of the former Soviet Union (Kyrgyzstan, Ukraine, Northern Caucasus).

Tapiroid remains are also extremely rare in Europe, in general; scarce finds are known from Spain, France, Germany, Austria, Italy, Serbia, Bosnia, Hungary, Slovakia, Romania, Bulgaria.

The Tapiroidea remains are classified here in compliance with the criteria proposed by McKenna & Bell (1997).

Keywords: Tapiroidea, Tapiridae, Lophialetidae, Deperetellidae, Helaletidae, Isectolophidae, Kazakhstan.

INTRODUCTION

Kazakhstan territory is rich in deposits that have brought to light an extremely rich collection of ancient fossil remains dated from the Paleocene up to Pleistocene (becoming richer especially starting with the Oligocene). The peak of the Tapiroidea development occurred during the Eocene, therefore representatives of Tapiroidea were found in almost all Eocene, as well as in some Oligocene Kazakh deposits.

Systematic studies on Tapiroidea in Kazakhstan were initiated by Borissyak (1918:1319-1322).

Until to-day, five of the six Tapiroidea families – Tapiridae GRAY 1821, Lophialetidae MATTHEW & GRANGER 1925, Deperetellidae RADINSKY 1965, Helaletidae OSBORN 1892, and Isectolophidae PETERSON 1919 – have been recorded in Kazakhstan.

As general rule, most of the Tapiroidea remains come from Eastern Kazakhstan (Zaysan basin and Jungarya) and from Central Kazakhstan (Turgay depression) (Bajanov, 1960, 1962; Belyaeva & al., 1962; Biryukov, 1962, 1969; Biryukov & Kostenko, 1965; Gabunya, 1962, inter alios).

Fig. 1 - illustrates the Kazakh sites with tapiroid remains described in this paper.

Acronyms used in the text are as follows:

AN SSSR - USSR Academy of Sciences, Moscow/Leningrad;

ICZN - International Code of Zoological Nomenclature;

IP AN GruzSSR - Institute of Palaeobiology, Georgian Academy of Sciences, Tbilisi;

IZ AN KazSSR - Laboratory of Palaeobiology, Zoological Institute, Kazakh Academy of Sciences, Almaty (former Alma-Ata);

Izd-vo - Izdatel'stvo (Publishing House);

PIN - Palaeontological Institute, Russian Academy of Sciences, Moscow;

ZIN - Zoological Institute, Russian Academy of Sciences, St-Petersburg.

TAPIROID MATERIAL

The tapiroid remains are classified here in compliance with the criteria proposed by McKenna & Bell (1997).

Classis **MAMMALIA** LINNAEUS 1758

Subclassis **THERIA** PARKER & HASWELL 1897

Infraclassis **EUTHERIA** GILL 1872

Grandordo **UNGULATA** LINNAEUS 1766

Mirordo **ALTUNGULATA** PROTHERO & SCHOCH 1989

Ordo **PERISSODACTYLA** OWEN 1848

Subordo **CERATOMORPHA** WOOD 1937

Infraordo **TAPIROMORPHA** HAECKEL 1866

Superfamilia **TAPIROIDEA** GRAY 1825

Familia **TAPIRIDAE** GRAY 1821

Protapirus FILHOL 1877

Protapirus gromovae BIRJUKOV 1972

According to Biryukov (1972:169-170), *Protapirus gromovae* Biryukov 1972 was attested by a large isolated second upper molar with a very low crown (M², fig. 5, measurements in tab. 7) (IZ AN KazSSR 1055-21/48-T, holotype) found in 1948 in a ravine cut in Early Oligocene-Late Miocene deposits situated along the Ashut river (Turgay depression, Kostanai [former Kustanay] region, Central Kazakhstan; Fig. 1–loc 2). The specimen was previously attributed by Gromova (1960) to *Protapirus* sp.

Other Early Oligocene–Late Miocene remains of the same species were found in the Turgay region.

Familia **LOPHIALETIDAE** MATTHEW & GRANGER 1925

Eoletes BIRJUKOV 1974

Eoletes gracilis BIRJUKOV 1974

Plate I, figs. 1a, 1b

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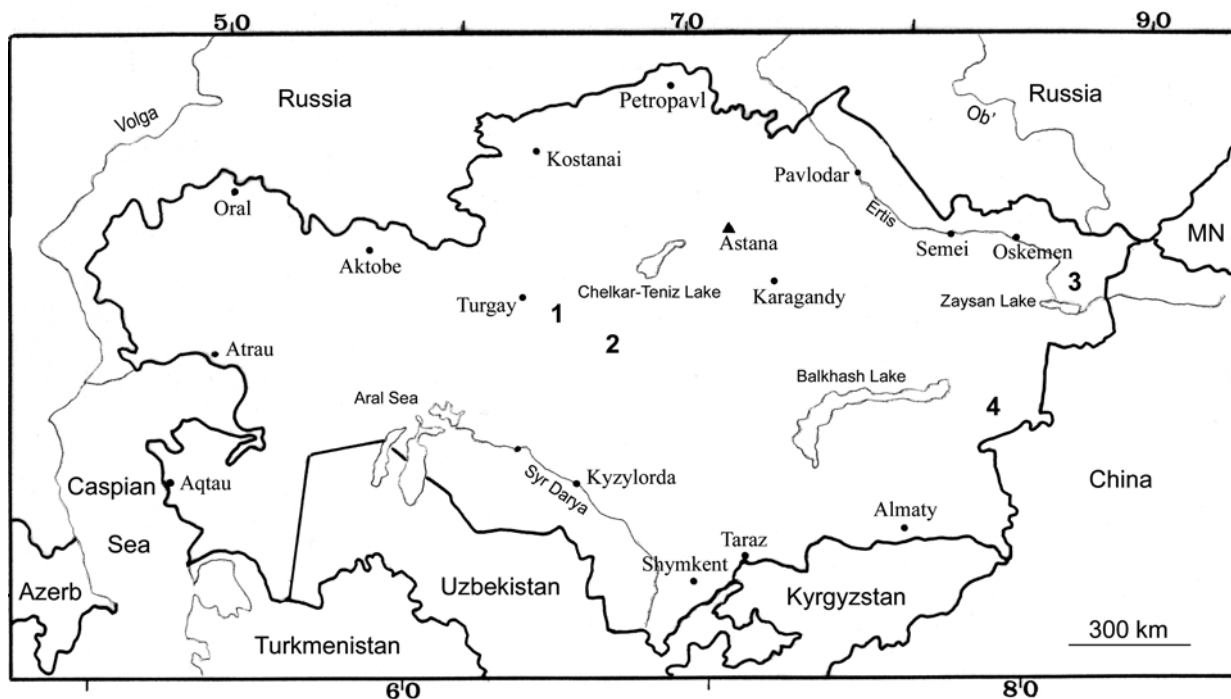


Figure 1 – Index maps of the geographical location of the Kazakh deposits where tapiroids remains were found: 1) Shalkarteniz (Chelkar-Teniz lake); 2) Ashut river and Myneskiyuek (Turgay depression, Kostanai [former Kustanay] region); 3) Obayla river, Kiin-Kerish Mountains, Maykapchagay, Chakpaktas, Mozhevelnik, Chaibulak, Aksyr, Ulken Ulasty, and Kalmakpay (Zaysan basin); 4) Shynzhily river (Alakol district, Taldy-Kurgan region, Northern Jungarya, Southeastern Kazakhstan).

This large-sized tapiroid was testified by several Middle Eocene remains from the “Kolpakhovskaya svita” (“Kolpak” Formation) in the eastern (right) bank of the Shynzhily river (about 8 km north of Kabanbai village, Alakol district, Taldy-Kurgan region, Northern Jungarya, Southeastern Kazakhstan; Fig. 1–loc 4) (Biryukov, 1974a:57-73; Reshetov, 1979:21; Lucas & al., 1997:236-242):

- the holotype, a skull (IZ AN KazSSR 5088/69-Chzh) providing with both complete upper dental ranges (P¹-M³) (Biryukov, 1974a, figs 1, 2, 3; Reshetov, 1979, fig. 3; Lucas & al., 1997, fig. 3–A, B, C, D, fig. 4–D, fig. 6–A, B, C) (Plate I, figs. 1a, 1b, this paper);

- a rostrum providing with right I¹-I³, C, P²-M² and left P¹-M³ ranges (IZ AN KazSSR 4773/68) (Biryukov, 1974a, fig. 4; Lucas & al., 1997, fig. 4–A, B, C);

- a highly-damaged maxillary fragment with P²-P³ (IZ AN KazSSR 4822/68);

- a right odontological fragment with dp⁴-m² (IZ AN KazSSR 4845/68);

- a left odontological fragment with i₂, dp⁴, m¹-m³ (IZ AN KazSSR 4846/68);

- a fourth upper deciduous premolar (dp⁴) (IZ AN KazSSR 34/139);

- a lower jaw with right and left p₁-m₃ (IZ AN KazSSR 4095/94);

- a lower jaw with right p₄-m₃ and left p₂-m₃ (IZ AN KazSSR 5083/69);

- a lower jaw with right and left p₂-m₃ (IZ AN KazSSR 5084/69) (Biryukov, 1974a, figs 5, 6; Lucas & al., 1997:240, fig. 5–A, B, C);

- a calcaneum (IZ AN KazSSR 3869/1966) (Lucas & al., 1997:240, fig. 5–F, G);

- various postcranial elements (tarsal bones, some of

them not-classified) (Biryukov, 1974a:68-72, figs 7-11, measurements in tabs 3-7; Lucas & al., 1997:238, fig. 5–D, E).

Both upper and lower teeth measurements are given in Biryukov (1974a:61-62, tabs 1, 2) and in Lucas & al. (1997:239, tab. 1). Until to-day, the fourth deciduous premolar represents the sole deciduous tooth known for *E. gracilis* (Lucas & al., 1997:242).

An incomplete dental series consisting of M¹-M³ (IZ AN KazSSR 4531/68-Chzh) – assigned to *Teleolophus beliajevi* Birjukov 1974 (recte *Teleolophus beliajevae* Birjukov 1974) by the same author (Biryukov, 1974b, fig 3) – from the “Kolpak” Formation in Shynzhily locality (Alakol district, Taldy-Kurgan region, Northern Jungarya, Southeastern Kazakhstan) actually belongs to *E. gracilis* (Lucas & al., 1997:242). However, it is untraceable in museum collections at present.

From the “Shakpaktas” Formation deposits (Eocene) in Mozhevelnik locality (Zaysan basin, Eastern Kazakhstan; Fig. 1– loc 3) come *Eoletes* sp. skeletal remains (Emry & al., 2001). Furthermore, Emry & al. (2001) assumed that remains from the same site ascribed to *Subhyracodon tshakpaktasensis* (Gabunya, 1999) must actually be assigned to *Eoletes* sp.

Moreover, remains of *Lophialetes* Matthew & Granger 1925 and *Schlosseria* Matthew & Granger 1926 were also recovered at Chakpaktas (Zaysan basin, Eastern Kazakhstan; Fig. 1– loc 3) (unpublished material).

***Breviodon* RADINSKY 1965**

***Breviodon* sp.**

From Eocene beds (“Obayla” Formation) of the Zaysan basin (Eastern Kazakhstan; Fig. 1– loc 3) comes

a small (length = 8.5 mm, width = 5.3 mm) isolated second lower molar (M_2) (PIN 2432-99) assigned to *Breviodon* sp. (Reshetov, 1979:27). Accordingly, tapiroids of the genus *Breviodon* were characterized by very small sizes.

Familia **DEPERETELLIDAE** RADINSKY 1965

Teleolophus MATTHEW & GRANGER 1925

Teleolophus beliajevi BIRJUKOV 1974 (recte *Teleolophus beliajevae* BIRJUKOV 1974)

The species was defined based on a maxillary fragment with a complete dental range (P^1 - M^3) (IZ AN KazSSR 4847/68-Chzh, holotype) of Middle Eocene age coming from the "Kolpak" Formation cropping out along the eastern (right) bank of the Shynzhlyly river (Alakol district, Taldy-Kurgan region, Northern Jungarya, Southeastern Kazakhstan; Fig. 1– loc 4) (Biryukov, 1974b:78, fig 1; Reshetov, 1979:37, figs. 6–2; Lucas & al., 1997:242-243, fig. 7–A, measurements on p. 242) (Plate I, fig. 2, this paper).

An incomplete dental series consisting of M^1 - M^3 (IZ AN KazSSR 4834/68-Chzh) assigned to *T. beliajevae* by Biryukov (1974b, fig 2) from the "Kolpak" Formation in Shynzhlyly locality (Alakol district, Taldy-Kurgan region, Northern Jungarya, Southeastern Kazakhstan) appears to be untraceable in museum collections at present. In any case, further studies performed on this material pointed out the great similarity of *T. beliajevi* with *Teleolophus medius* Matthew & Granger 1925. Therefore *T. beliajevi* was defined as synonym (junior subjective synonym of *T. medius*) (Lucas & al., 1997:243).

Furthermore, the above mentioned authors rightly emphasized that the name of this species – named in honour of the Russian palaeontologist Elena I. Belyaeva – should contain the Latin feminine suffix "ae", not the masculine "i", in accordance with the Art. 31 of the ICZN (1985) (Lucas & al., 1997:242).

Teleolophus zaisanicus GABUNYA 1984

Only one isolated third lower molar (M_3) (IP AN GruzSSR L-33, holotype) from the Middle Eocene of Obayla (Zaysan basin, Eastern Kazakhstan; Fig. 1– loc 3) is attributed to this species (Gabunya, 1984:130-132).

Familia **HELALETIDAE** OSBORN 1892

Helaletes MARSH 1872

Helaletes mongoliensis (OSBORN 1923)

Eocene remains of this species come from the "Obayla" Formation along the Obayla river (Zaysan basin, Eastern Kazakhstan; Fig. 1– loc 3) (Reshetov, 1979:15-16) (unknown collections).

H. mongoliensis was a tapiroid of relatively large size. Remains of this species were also identified in the Eocene deposits of Mongolia, Northern China, and Northern America.

Colodon MARSH 1890

Colodon orientalis BORISSIAK 1918

This species is represented by:

– a maxillary fragment provided with a complete dental range (P^1 - M^3) (PIN 1442-49, holotype) found in Middle Oligocene deposits from Shalkarteniz (Chelkar-Teniz lake, Central Kazakhstan; Fig. 1– loc 1) (Borissyak, 1918:27; fig. 1) (Plate I, fig. 3, this paper) (vide autem in Gromova, 1960:93 and in Radinsky, 1965:233);

– three calcanea (IZ AN KazSSR 858-3/48-T, 351-

31/47-T, and 252-31/48-T) collected from Middle Oligocene beds in Myneskisuyek (Turgay depression, Kostanai [former Kustanay] region, Central Kazakhstan; Fig. 1– loc 2) (Gromova, 1960:79-107);

– a calcaneum (IZ AN KazSSR 3K-57 335/761) and two astragali (IZ AN KazSSR 3K-57 211/412 and 3K-57 200/309) coming from the Late Eocene–Early Oligocene of the Kiin-Kerish Mountains (Northern Prizaysan', Zaysan basin; Fig. 1– loc 3) (Biryukov, 1972:167; not figured; measurements: astragali, in tab. 1, p. 161 – calcaneum, in tab. 5);

– two astragali (IZ AN KazSSR O 194-153/54-T and O 442-44/54-T) and an os naviculare (IZ AN KazSSR O 320-45/54-T) recovered from Middle Oligocene beds in Myneskisuyek (Turgay depression, Kostanai [former Kustanay] region, Central Kazakhstan; Fig. 1– loc 2) (Biryukov, 1972:168; not figured; measurements: astragali, in tab. 1, p. 161 – os naviculare, in tab. 6).

– three astragali (IZ AN KazSSR 350-30/47-T, 275-167/54-T, and 329-150/54-T) from Myneskisuyek (Central Kazakhstan; Fig. 1– loc 2) (Gromova, 1960:79-107).

Remains of *C. orientalis* were also found in the Middle Oligocene beds of the Kiin-Kerish Mountains (Northern Prizaysan', Zaysan basin; Fig. 1– loc 3) (Belyaeva & al., 1962:311-312; Reshetov, 1979:18-19) as well as in both Asian and North American Early–Middle Oligocene deposits.

In Eocene deposits of the "Obayla" Formation cropping out along the Obayla river near Maykapchagay (south-eastern part of the Zaysan basin, Eastern Kazakhstan; Fig. 1– loc 3) a singular tapiroid (third or fourth) upper premolar (PIN 2432-98) of relatively great dimensions was found. It was confidently ascribed to the Helaletidae family (Reshetov, 1979:17-18).

Familia **ISECTOLOPHIDAE** PETERSON 1919

According to Gabunya (1961), two Isectolophidae (gen. indet.) fragmentary upper molars (M^1 and M^2) were recovered from Obayla (Zaysan basin, Eastern Kazakhstan; Fig. 1– loc 3).

Few other odontological remains belonging to this family were discovered in Mongolia, China, and Northern America (vide autem in Reshetov, 1979:12-14).

Finds of other representatives of both Lophialetidae and Deperetellidae families were attested from Eocene deposits at Shynzhlyly (Alakol district, Taldy-Kurgan region, Northern Jungarya, Southeastern Kazakhstan; Fig. 1– loc 4) (Kojamkulova & Orlovskaya, 1971). Other representatives of the Lophialetidae, Deperetellidae, Helaletidae, and Isectolophidae families coming from Eocene deposits of the villages of Chaibulak, Aksyjr, Ulken Ulasty, and Kalmakpay (all localities located in the Zaysan basin; Fig. 1– loc 3) are also known (Gabunya, 1984:130-132).

Finally, works carried out between 1993-1995 in Zaysan basin by a Kazakh-American scientific team increased the previous knowledge on Tapiroidea in this region.

RHINOCEROTOID FOSSIL MATERIAL PREVIOUSLY ASSIGNED TO TAPIROIDS

The following three species, formerly assigned to the tapiroid superfamily, should be currently referred to the superfamily Rhinoceroidea GRAY, 1925.

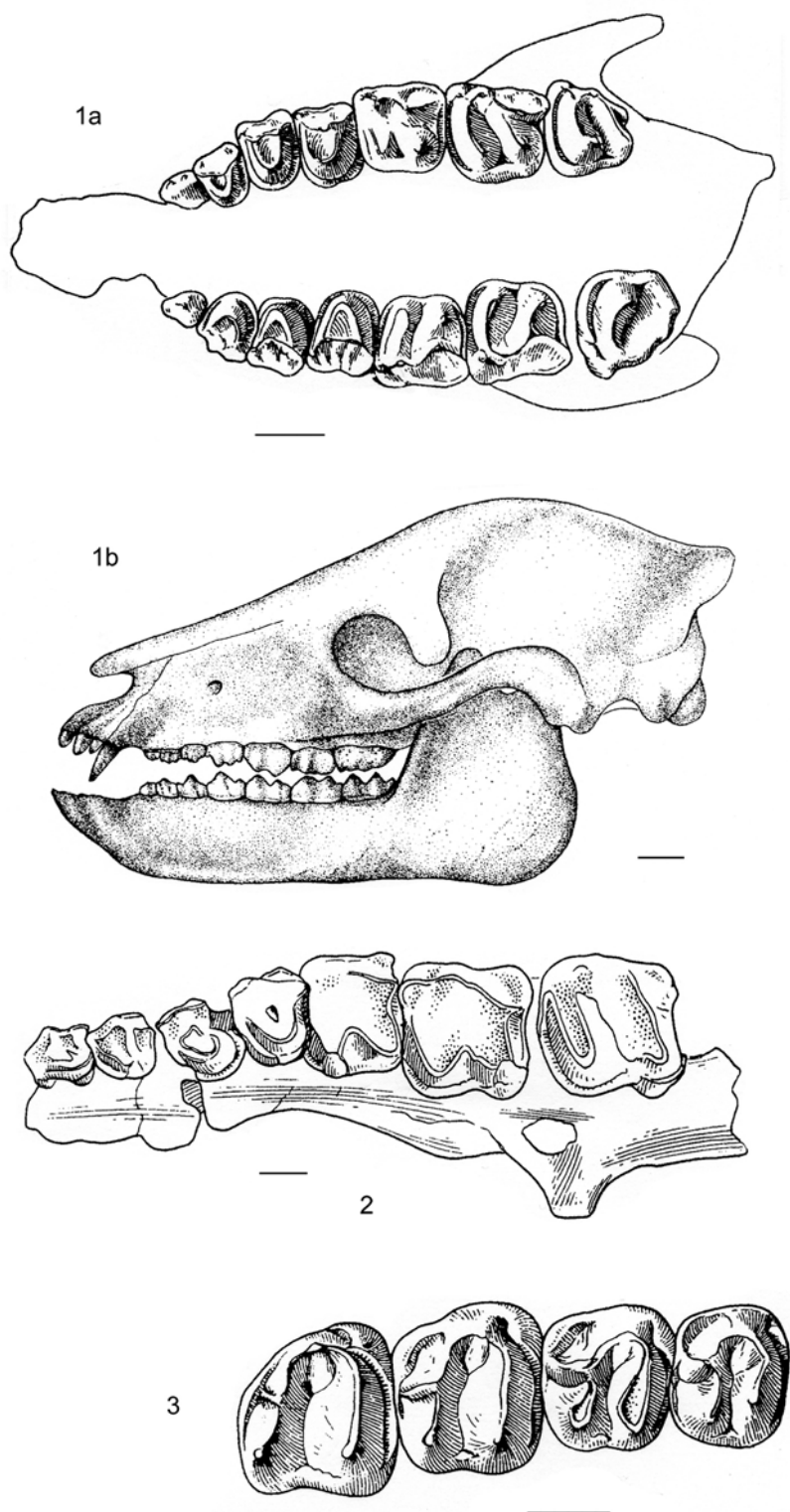


Plate I – *Eoletes gracilis* BIRJUKOV 1974; Middle Eocene, “Kolpak” Formation; right bank of the Shynzhlyly river (Alakol district, Taldy-Kurgan region, Northern Jungarya, Southeastern Kazakhstan); skull (IZ AN KazSSR 5088/69-Chzh, holotype), (1a) basal view (dental ranges, P¹-M³) and (1 b) restoration of the same skull with mandible (lateral view) (Laboratory of Palaeobiology, Zoological Institute of the Kazakh Academy of Sciences, Almaty [former Alma-Ata]) – *Teleolophus beliajevae* BIRJUKOV 1974; Middle Eocene, “Kolpak” Formation; right bank of the Shynzhlyly river (Alakol district, Taldy-Kurgan region, Northern Jungarya, Southeastern Kazakhstan); maxillary fragment with P¹-M³ (IZ AN KazSSR 4847/68-Chzh, holotype), (2) occlusal view (Laboratory of Palaeobiology, Zoological Institute of the Kazakh Academy of Sciences, Almaty [former Alma-Ata]) – *Colodon orientalis* BORISSIAK 1918; Middle Oligocene; Shalkarteniz (Chelkar-Teniz lake, Central Kazakhstan); P⁴-M³ (PIN 1442-99, holotype), (3) occlusal view (Palaeontological Institute, Russian Academy of Sciences, Moscow).
Scale bar = 1 cm (1a, 2, and 3, after Reshetov, 1979; 1b, after Lucas & al., 1997).

Ergilia GROMOVA 1952 (= **Ardynia** MATTHEW & GRANGER 1923)

Ergilia kazachstanica GROMOVA 1960

Late Eocene–Middle Oligocene osteological remains ascribed to this species were recovered from five Kazakh localities: Kiin-Kerish Mountains (Northern Prizaysan', Zaysan basin) (Biryukov, 1972:160-162), Shintuzsay (about 40 km southeast of Turgay, Turgay depression, Kostanai [former Kustanay] region, Central Kazakhstan) (Gromova, 1960:79-107), Myneskisuyek (Turgay depression, Kostanai [former Kustanay] region, Central Kazakhstan) (Biryukov, 1972:162-166; Gromova, 1960:79-107), Shalkarteniz (Chelkar-Teniz lake, Central Kazakhstan) (Biryukov, 1972:163), and Aqtau' [former Aktau] (Aqtau' Mountains, Southwestern Jungarya, Southwestern Kazakhstan) (Bajanov & Kostenko, 1961).

However, *Ardynia* (*Ergilia*) *kazachstanica* considered as a species belonging to the Helaletidae family by Gromova (1952) was later referred to the rhinocerotoid family Hyracodontidae COPE 1879 by Radinsky (1965, 1967) on the basis of its skeletal remains from Mongolia.

According to McKenna & Bell (1997), the following two other species also fall into the rhinocerotoid family Hyracodontidae COPE 1879 (subfam. Hyracodontinae COPE 1879). According to Radinsky (1965) and Prothero & Schoch (1989), the first one is identical with *Helaletes nanus* MARSH 1871 known from the Middle Eocene of North America.

Veragromovia GABUNIA 1961

Veragromovia desmatotheroides GABUNIA 1961

This Eocene species from the "Obayla" Formation along the Obayla river (Zaysan basin, Eastern Kazakhstan; Fig. 1– loc 3) was described based on an isolated third upper molar (M^3) (IP AN GruzSSR 3-V, holotype) by Gabunya (1961:711, 1962:22) (vide autem in Reshetov, 1979:16).

Rhodopagus RADINSKY 1965

Rhodopagus minutissimus RESHETOV 1979 (holotype: maxillary fragment PIN 3486-1 from Andarak II, Kyrgyzstan).

Rhodopagus sp. aff. *R. minutissimus* RESHETOV 1979

Middle Eocene remains referred to this species were discovered in Chakpaktas (Zaysan basin) (Gabunya, 1983:456-457).

Rhodopagus sp.

A very small, isolated (second or third) upper premolar (PIN 2432-12) assigned to *Rhodopagus* sp. was recovered from "Obayla" Formation deposits (Eocene) along the Obayla river near Maykapchagay (south-eastern part of the Zaysan basin) (Reshetov, 1979:30-31). *Rhodopagus* sp. remains also come from Chakpaktas (Zaysan basin) (unpublished material).

CONCLUSIONS

Obviously, this paper does not pretend to be exhaustive. The aim of the present work is only that of giving a new concise view regarding the tapiroid occurrences in Kazakhstan.

As far as the rest of the former Soviet Union is concerned, tapiroids are barely represented.

Most of their remains come from Kyrgyzstan where they were found in Middle Eocene "alay" levels at Andarak (Andarak I) and in Middle Eocene deposits along the

Toruaygyr river:

– at Andarak I, *Deperetella ferganica* BELIAJEVA, 1962 (fam. Deperetellidae) is testified by a singular second upper premolar (P^2) (PIN 1996-1, holotype) (Belyaeva, 1962:144–fig. 1; Reshetov, 1979:38–39–fig. 6–3);

– on the right bank of the Toruaygyr river (0.5 km from its confluence with the Kuul'dek river, southern slope of the Kungey-Zailiy rise, southern border of the Toruaygyr plain) remains of *Deperetella kungeica* TARASOV, 1968 and *Teleolophus* sp. (fam. Deperetellidae), *Lophialetes expeditus* MATTHEW & GRANGER, 1925 and *Schlosseria* sp. (fam. Lophialetidae) (Tarasov, 1968; Nesmeyanov & al., 1977) were discovered.

Remains of *L. expeditus* (fam. Lophialetidae) (Eocene) were also found in five other Kyrgyzian localities: Irdyn-Manga, Ulan-Shire, Khaychin-Ula II, Khaychin-Ula III, and Kholboldji-Nur I (Reshetov, 1979:20-21).

Fossil remains belonging to the Tapiridae family are recorded from three localities only:

– Korotkevich (1967:1074-76) reported on a *Tapirus* sp. cf. *T. arvernensis* DEVÉZE ET BOUILLET, 1827 (recte CROIZET & JOBERT, 1828) third upper deciduous premolar (dp^3) (figured in Korotkevich, 1967:1075) found in 1964 in Middle Pliocene sand-gravel deposits of the Kuchurgan river valley near the village of Novopetrovka (Odessa district, Ukraine);

– poorly-characterized *Tapirus arvernensis* CROIZET & JOBERT, 1828 remains come from Miocene beds near Khutor Khmel'na (Circassia, Ukraine) (Dubrovo & Kapelist, 1979);

– a *Tapirus* sp. cf. *T. arvernensis* mandibular fragment (provided with four teeth) and two other skeletal remains come from the Pliocene levels of the "Kosyakinsky kar'er" ("Kosyakin quarry") (Stavropol' district, Northern Caucasus) without any specimen description (Belyaeva, 1948:83; Vereshchagin, 1954, 1959:52–tab. 3–fig. 25/3) (collections: PIN or ZIN).

More details about ex-USSR (Kazakhstan included) and Mongolian tapiroids are available in Reshetov (1979:12-42) and Dmitrieva & Nesmeyanov (1982).

Finally, tapiroid remains are also extremely rare in Europe, in general. At present, only scarce finds (*T. arvernensis*, *T. priscus* KAUP 1832, *T. balkanicus* SPASSOV & GINSBURG 1999, *Tapiriscus pannonicus* KRETZOÏ 1951) are known from Spain, France, Germany, Austria, Italy, Serbia, Bosnia, Hungary, Slovakia, Romania, and Bulgaria.

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