

# Introduction

Objekttyp: **Chapter**

Zeitschrift: **Eclogae Geologicae Helvetiae**

Band (Jahr): **57 (1964)**

Heft 2

PDF erstellt am: **22.09.2024**

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lems and have given me an invaluable set of topotypes and samples from Southern Soviet Union. Professor Dr. N. I. MASLAKOVA, Professor Dr. D. P. NAIDIN and Professor Dr. G. I. NIEMKOV of the Moscow University have furnished me with valuable information and samples.

I am greatly indebted to Dr. P. NATURAL, chargé d'affaires, and Dr. K. FRITSCHI, Secretary of the Swiss Embassy in Moscow, for their help and hospitality.

Dr. E. GASCHE, head of the Geological Department of the Museum of Natural History, Basel, facilitated the study of type-material deposited in the Museum.

The excursions in the Central Apennines have been made possible by the generous help of my colleagues H. G. LORENZ and Dr. F. STUMM.

Sincere thanks for helpful advice and/or gifts or the loan of material or literature are also due to: Dr. V. P. ALIMARINA, MOSCOW, Dr. P. J. BERMUDEZ, Caracas, Prof. Dr. H. M. BOLLI, Zürich, Prof. Dr. P. BRÖNNIMANN, Geneva, Dr. R. LEHMANN, Bègles, Dr. L. HOTTINGER, Basel, Prof. Dr. R. MARLIERE, Mons, Prof. Dr. J. SIGAL, Paris, Dr. H. FARKHAN, Teheran, Dr. F. ALLEMANN, Bern, Dr. C. G. ADAMS, London, Dr. A. CASTELLARIN, Bologna, Dr. R. HERB, Zürich, Prof. Dr. O. L. BANDY, Los Angeles, Prof. Dr. V. G. MOROZOVA, MOSCOW, Dr. W. GIGON, The Hague, Prof. Dr. M. F. GLAESSNER, Adelaide, Mr. and Mrs. C. SCHILLER-FISCHER, Mexico, H. MOHLER, Basel, and Dr. H. FISCHER, Basel.

Dr. D. GROENHAGEN, Basel, helped me in the translation of some Soviet literature.

I am also indebted to Mrs. T. MANGER and Mr. E. WAGNER, Geological Institute, Basel, and Miss D. GROENHAGEN, Museum of Natural History, Basel, for their assistance in several technical problems.

Part of the costs connected with the field work in the Central Apennines has been granted by the «August Tobler-Fund» of the Museum of Natural History, Basel. My studies have been made possible by a scholarship from my native town.

Above all, I want to thank my parents, who made possible the present work by many sacrifices.

## INTRODUCTION

The last two decades have been marked by a rapid increase in the research on planktonic foraminifera and their application to the stratigraphical subdivision of the Paleogene. Two main centres of research have greatly contributed to this progress:

For the Western Hemisphere, it is the Caribbean region and mainly Trinidad, where a detailed zonation of world-wide applicability has been worked out (BOLLI, BRÖNNIMANN, BERMUDEZ, H. H. RENZ, CUSHMAN).

In the European part of the Southern Soviet Union, equivalent work has been done by Soviet specialists (SUBBOTINA, MOROZOVA, SHUTZKAYA, ALIMARINA and others).

By this almost independent and parallel development concerning the knowledge of planktonic foraminiferal faunas during the Paleogene, numerous differences, concerning the interpretation of different species and their stratigraphic range, have been inevitable.

It seemed, therefore, necessary to revise some Paleogene *Globorotalia* and to furnish additional data on their stratigraphic distribution and taxonomic relations. In the beginning, much time was spent with a rich and excellently preserved fauna from the Velasco shales of Eastern Mexico. Statistical analysis of the forms belonging to the *Globorotalia velascoensis* group, which has been undertaken in collaboration with W. W. HAY, has not yet been successful. The present writer shares the scepticism expressed by R. LEHMANN (1963) towards the application of statistical analysis to smaller foraminifera.

Since the relations of different species are not controllable in a stratigraphically isolated sample, it soon became necessary to study the development of the species in a continuous section. Based on the thesis of O. RENZ (1936), such sections have been found in the Scaglia exposed in the Central Apennines. The present study is based on isolated faunas, whereas RENZ based his information on thin sections. The stratigraphic section in the Gola del Bottacione («Gubbio section») immediately north of the town of Gubbio (Prov. di Perugia) has been chosen as a standard section. Two neighbouring parallel sections have been investigated as a control.

The present paper is restricted to the group of «keeled» *Globorotalia* within the Paleocene and Lower Eocene and moreover to forms which are thought to be their predecessors.

The quite puzzling problems of synonymy which sometimes arose, made it necessary to examine, as far as possible, topotypes and type-samples. For this purpose, KUGLER's type-collection of species established for the Caribbean region and topotypes donated by SUBBOTINA and SHUTZKAYA have been of great value.

The achievements of Soviet specialists are discussed to some extent. They have not yet obtained the evaluation they deserve by most of the authors in Western Europe and America.

The present paper is divided into two main parts. The first one is mainly dedicated to systematic problems and to the description of the different species. The second part is restricted to the description of the measured sections and to a brief discussion of some stratigraphic questions.

The present paper has not the aspiration to settle exhaustively the problems concerned. On the contrary, more problems have arisen with the study of additional material. It is hoped, however, that some of them may be discussed in future papers.

The figures represent camera lucida drawings executed by the author.

If not mentioned otherwise, the figured specimens are deposited in the collections of the Museum of Natural History, Basel (catalogue numbers C 20548–C 20668).

#### A. SYSTEMATIC PART

### Remarks on the generic classification of *Globorotalia*

Before 1927, the species referred at present to the genus *Globorotalia* were placed in such different genera as *Pulvinulina*, *Discorbina*, *Rosalina*, *Rotalina*, *Planulina* and others.