

Lower Paleogene Biostratigraphy of Cuba

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Micropaleontology, Volume 45, supplement 2

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CONTRIBUTIONS

AUBRY, M.-P., 1999. Late Paleocene-Early Eocene Sedimentary History in Western Cuba: Implications for the LPTM and for Regional Tectonic History.

BLANCO-BUSTAMANTE, S., FERNÁNDEZ-RODRÍGUEZ, G., and FLUEGEMAN, R. H., 1999. A note on the biostratigraphy of Paleocene-Eocene larger foraminifera from western Cuba.

FERNÁNDEZ-RODRÍGUEZ, G., BLANCO-BUSTAMANTE, S., and FLUEGEMAN, R. H., 1999. Paleocene-Eocene planktonic foraminiferal biostratigraphy of western Cuba.

FLUEGEMAN, R. H., 1999. Preliminary study of the benthic foraminifera of the San Francisco de Paula section (upper Paleocene-lower Eocene), Ciudad de La Habana, Cuba.

SANFILIPPO, A., and HULL, D. M., 1999. Upper Paleocene-lower Eocene radiolarian biostratigraphy of the San Francisco de Paula section, western Cuba: Regional and global comparisons.

AUBRY, M.-P., BLANCO-BUSTAMANTE, S., FERNÁNDEZ-RODRÍGUEZ, G., FLORES ALBIN, E., FLUEGEMAN, R. H., HULL, D. M., SANFILIPPO, A., SINHA, A., and VAN FOSSEN, M., 1999. The upper Paleocene-lower Eocene San Francisco de Paula section: Biostratigraphic synthesis.

Foreword

Project 308 "Paleocene/Eocene Boundary Events in Space and Time" of the International Geological Correlation Programme (IGCP) has been actively involved in integrated studies of upper Paleocene-lower Eocene land (marine and terrestrial) sections from distant geographic areas. Thus, after a reassessment of the stratigraphic correlations in northwestern Europe—the cradle of Paleogene chronostratigraphy—collaborative research developed as sections in Argentina, the Caucasus, Chile, Crimea, Cuba, Egypt, the Gulf Coast Plain of North America, Israel, Italy, the New Jersey Margin, the North American terrestrial record (Bighorn and San Juan Basins), Pakistan and Spain, were collected for integrated studies. Coupled with the study of deep sea sections, and now extended to other parts of the world (e.g., China, New Zealand, Tunisia), these studies have yielded multiple lines of evidence that the latest Paleocene (~55.5 Ma) was the most critical moment in the Cenozoic evolution of the Earth System.

In this special issue of *Micropaleontology*, we present the results of our micropaleontological investigations in western Cuba. Five sections were collected in January 1993 by a field party led by Richard Fluegeman, Ball State University, and guided by our Cuban Colleagues Gená Fernández-Rodríguez and Emilio Flores-Albin. The Cuban team was composed of members of the Oil Development Research Center in Habana and of the University in Pinar del Rio, and included, L. Díaz, J. Fernandez, D. Garcia, and R. Garcia. The non-Cuban team included Annika Sanfilippo (Scripps Institution of Oceanography) and Donna Hull (University of Texas, Dallas) for studies on radiolarians, Ashish Sinha (University of Southern California) for isotopic studies and Mickey von Fossen (Rutgers University) for magnetostratigraphy. Unfortunately, the magnetic record of all rocks sampled was overprinted (M. van Fossen, personal communication, January 1994), and the stable isotopic record diagenetically altered (A. Sinha, personal communication; see Aubry).

Micropaleontologic investigations in Cuba were numerous until the late 1950s, and the publications of Bermudez (e.g., 1949, 1950, 1961), Cushman and Bermudez (between 1936-1948), and Brönnimann and Stradner (1960) contributed to a comprehensive synthesis of the geology of western Cuba (Brönnimann and Rigassi 1963). This classic latter work provided the lithostratigraphic and planktonic biostratigraphic framework for western Cuba, which still serve as a basic reference for field investigation. Since then, micropaleontologic investigations have continued in Cuba, albeit at a slower rate, but, except for the recent publication by Bralower and Iturralde Vinent (1997), they have remained largely unknown, inaccessible and poorly documented. We see the publication of this *Micropaleontology Supplement* as an opportunity to document further micropaleontological data gathered by some of our Cuban colleagues over the last two decades or so.

Our interest in the upper Paleocene-lower Eocene record of western Cuba stems from published data that suggested to us

that some section(s) might be continuous through the Chron C24r interval. Indeed, from the seminal studies by Brönnimann and Stradner (1960) and Brönnimann and Rigassi (1963) and subsequent studies by Flores and Fernández-Rodríguez (1985), it seemed that the Paleocene/Eocene boundary (i. e., base of the Ypresian Stage) might be located within the Apolo or the Alcazar Formation (of the Bahia tectonic unit). We were thus hoping to identify a section in the vicinity of La Habana, with the potential to serve as a GSSP for the Paleocene/Eocene boundary. With this goal in mind, priority was given to sampling the 56m thick upper Paleocene-lower Eocene San Francisco de Paula section for integrated magneto-, bio- and chemostratigraphic analysis, and subsequently the poorly known 11.8m thick San Agustine section. We also investigated three sections through the Ancon and/or Manacas Formations, two lithologic units that outcrop in the Guaniguano belt west of the Pinar Fault in the Pinar del Rio Province (Bralower and Iturralde-Vinent 1997). These are the Sierra Guacamaya and El Moncada sections and the section at Kilometer 17 on the Pons-Vinãles Road.

Planktonic foraminiferal stratigraphy of the five sections collected is discussed herein (Fernández-Rodríguez et al.), but the emphasis in the 5 papers in this issue has been placed on the San Francisco de Paula section, and to a lesser extent the San Agustine section, the two potential GSSP sections. Although it turned out that neither is suitable as a GSSP, these two sections, which constitute complementary, albeit discontinuous, upper Paleocene-lower Eocene records, provide new information on land-based Caribbean lower Paleogene radiolarian biostratigraphy (Sanfilippo and Hull), the first determination, using benthic foraminifera (Fluegeman), of the paleobathymetry and sedimentary regime during the late Paleocene-early Eocene in the area where the Apolo and Capdevila Formations were deposited, and a preliminary documentation of the biostratigraphy of the larger benthic foraminifera (Blanco-Bustamente et al.). In addition, it reports the occurrence of the late Paleocene thermal maximum calcareous nannofossil assemblage in the Caribbean, a peculiar assemblage that represents the counterpart of the planktonic foraminiferal excursion taxa, and that is now known to have stretched from the Caribbean to the western Indian Ocean through the North Atlantic Ocean and the Tethys (Aubry). Finally, our study of the San Francisco de Paula section documents the occurrence of a number of unconformities (Aubry, Fernández-Rodríguez et al.) that may reflect, at least in part, major tectonic events linked to the collision between the North American Plate and the Greater Antillean Arc dated as late Paleocene-early Eocene (Bralower and Iturralde Vinent 1997).

It might be said that our expectations from the field trip to Cuba have not been met. The section that will be chosen to yield the GSSP for the Paleocene/Eocene boundary is unlikely to be located in Cuba. The San Francisco de Paula section, that we expected to be a continuous record of Chron C24r, is in fact a succession of unconformity-bounded units that represents little of the chron. This does not make the results of our study less in-

teresting. However, there has been a tendency in recent years to discard short sections or sections which yield unconformities, for the benefit of expanded sections believed to represent a long time interval. It may be that the search for sections suitable as GSSP has encouraged stratigraphers to focus their attention on apparently “ideal”, expanded sections to the detriment of “less than ideal” ones, such as the San Francisco de Paula and San Augustine sections. We hope that this publication will serve to demonstrate the role that *any* section has in helping us interpret earth history. For instance, the discovery of the LPTM calcareous nannofossil assemblage in the 5m-thick interval of the San Augustine section sampled for calcareous nannofossils is one of those findings that bring critical clues compared to the more extended, but nevertheless controversial records of ODP Sites 999 and 1001. Yes, some sections are better than others, but all sec-

tions yield evidence that eventually contribute to the global understanding of the earth system. Stratigraphy is not about analyzing the apparently best sections. It is about correlating all sections available for a better understanding of earth history.

It is our pleasure to thank our Cuban colleagues for making our field trip—and thus this publication— possible. In particular we express our deepest thanks to Manuel Iturralde-Vinent who greatly facilitated our visit to Cuba, and to Gena Fernández-Rodríguez, Emilio Flores-Albin and their colleagues for leading us in the field, helping us collect, and for sharing information and material with us. We thank the reviewers of the manuscripts herein, and Greg Dinkins at Micropaleontology Press for his diligent final editing of the manuscripts. This publication is a (belated) contribution to IGCP project 308.

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