

**LAKE BASINS
THROUGH
SPACE AND TIME**

Edited by
E. H. Gierlowski-Kordesch
and
K. R. Kelts

AAPG Studies in Geology #46

Published by
The American Association of Petroleum Geologists
Tulsa, Oklahoma, U.S.A.
Printed in the U.S.A.

Table of Contents

| | |
|--|-----|
| Preface | iii |
| Section I Selected Topics | |
| Chapter 1 | |
| Lake-Basin Type, Source Potential, and Hydrocarbon Character: An Integrated Sequence-Stratigraphic-Geochemical Framework | 3 |
| <i>K.M. Bohacs, A.R. Carroll, J.E. Neal, and P.J. Mankiewicz</i> | |
| Chapter 2 | |
| Lakes During the Evolution of Mongolia | 35 |
| <i>C. Sladen and J.J. Traynor</i> | |
| Chapter 3 | |
| Cenozoic Lacustrine Deposits of the Ili Basin, Southeastern Kazakhstan | 59 |
| <i>S.G. Lucas, B.Zh. Aubekeroov, A.K. Dzhambangaraeva, B.U. Bayshashov, and L.A. Tyutkova</i> | |
| Section II Carboniferous to Permian | |
| Chapter 4 | |
| Temporary Desert Lake Deposits, Lower Permian (Rotliegendes), Southern Scotland, U.K. | 67 |
| <i>M.E. Brookfield</i> | |
| Chapter 5 | |
| Late Permian Playa Lake Deposits of the Southern Permian Basin (Central Europe) | 75 |
| <i>R. Gaupp, R. Gast, and C. Forster</i> | |
| Chapter 6 | |
| The Gai-As Lake System, Northern Namibia and Brazil | 87 |
| <i>H. Stollhofen, I.G. Stanistreet, R. Rohn, F. Holzförster, and A. Wanke</i> | |
| Section III Permian-Triassic to Jurassic | |
| Chapter 7 | |
| Lacustrine Deposits of the Upper Permian Pingdiquan Formation in the Kelameili Area of the Junggar Basin, Xinjiang, China | 111 |
| <i>Zhao Xiafei and Tang Zhonghua</i> | |
| Chapter 8 | |
| Permian Lacustrine Deposits of Northwest China | 123 |
| <i>M.A. Wartes, A.R. Carroll, T.J. Greene, Cheng Keming, and Hu Ting</i> | |
| Chapter 9 | |
| Triassic Lacustrine Sedimentation from the Tanzhuang Formation, Jiyuan-Yima Basin, Southeastern China | 133 |
| <i>M.G. Mángano, L.A. Buatois, Wu Xiantao, Sun Junmin, and Zhang Guocheng</i> | |
| Chapter 10 | |
| Sedimentology and Paleogeography of the Middle Jurassic Qiketai Formation, Turpan-Hami Basin, Northwest China | 141 |
| <i>T.J. Greene, A.R. Carroll, M.S. Hendrix, Cheng Keming, and Zeng Xiao Ming</i> | |
| Chapter 11 | |
| The Todilto Salina Basin, Middle Jurassic of the U.S. Southwest | 153 |
| <i>S.G. Lucas and O.J. Anderson</i> | |

| | |
|---|-----|
| Chapter 12 | |
| Triassic-Jurassic Lacustrine Deposition in the Fundy Rift Basin, Eastern Canada | 159 |
| <i>L.H. Tanner</i> | |
| Chapter 13 | |
| Early Jurassic Rift-Valley-Related Alkaline Lake Deposits Interbedded with Karoo Flood Basalts, Southern Namibia | 167 |
| <i>H. Stollhofen, I.G. Stanistreet, and S. Gerschütz</i> | |
| Chapter 14 | |
| Lacustrine Carbonates of the Morrison Formation (Upper Jurassic, Western Interior), East-Central Colorado, U.S.A. | 181 |
| <i>S.P. Dunagan</i> | |
| Chapter 15 | |
| Jurassic Lake Deposits from the Anyao Formation, Jiyuan-Yima Basin, Central China | 189 |
| <i>L.A. Buatois, M.G. Mángano, Wu Xiantao, and Zhang Guocheng</i> | |
| Section IV Early to Middle Cretaceous | |
| Chapter 16 | |
| Late Jurassic to Mid-Cretaceous Lacustrine Sequences in the Araripe-Potiguar Depression of Northeastern Brazil | 197 |
| <i>J.M. Mabesoone, M.S.S. Viana, and V.H. Neumann</i> | |
| Chapter 17 | |
| Syn-Rift Lacustrine Deep-Water Deposits: Examples from the Berriasian Sandy Strata of the Recôncavo Basin, Northeastern Brazil | 209 |
| <i>H.T.F. da Silva, J.M. Caixeta, L.P. Magnavita, and C.P. Sanches</i> | |
| Chapter 18 | |
| Rift Lake Stratigraphy of the Lagoa Feia Formation, Campos Basin, Brazil | 225 |
| <i>H.D. Rangel and M. Carminatti</i> | |
| Chapter 19 | |
| Bioclastic Carbonate Lacustrine Facies Models in the Campos Basin (Lower Cretaceous), Brazil | 245 |
| <i>M.D. de Carvalho, U.M. Praça, A.C. da Silva-Telles Jr., R.J. Jahnert, and J.L. Dias</i> | |
| Chapter 20 | |
| The Early Cretaceous of the Iberian Basin (Northeastern Spain) | 257 |
| <i>A.R. Soria, A. Meléndez, M. Aurell, C.L. Liesa, M.N. Meléndez, and J.C. Gómez-Fernández</i> | |
| Chapter 21 | |
| Continental Deposits of the Eastern Cameros Basin (Northern Spain) During the Tithonian-Berriasian Time | 263 |
| <i>N. Meléndez and J.C. Gómez-Fernández</i> | |
| Chapter 22 | |
| A Coastal Lacustrine System in the Lower Barremian from the Oliete Subbasin, Central Iberian Range, Northeastern Spain | 279 |
| <i>A. Meléndez, A.R. Soria, and N. Meléndez</i> | |
| Chapter 23 | |
| Early Cretaceous Lacustrine Systems of the Aguilón Subbasin, Central Iberian Range, Northeastern Spain | 285 |
| <i>N. Meléndez, A.R. Soria, A. Meléndez, M. Aurell, and C.L. Liesa</i> | |
| Chapter 24 | |
| Lacustrine Evolution in a Basin Controlled by Extensional Faults: the Galve Subbasin, Teruel, Spain | 295 |
| <i>C.L. Liesa, A.R. Soria, and A. Meléndez</i> | |

| | |
|--|-----|
| Chapter 25 | |
| The Lacustrine Fossiliferous Deposits of the Las Hoyas Subbasin (Lower Cretaceous, Serranía de Cuenca, Iberian Ranges, Spain) | 303 |
| <i>M.A. Fregenal Martínez and N. Meléndez</i> | |
| Section V Late Cretaceous to Paleocene | |
| Chapter 26 | |
| Late Cretaceous and Early Paleocene Lacustrine Episodes in the Provence Basin, Southern France | 317 |
| <i>I. Cojan</i> | |
| Chapter 27 | |
| Lacustrine Facies in the Upper Cretaceous Balbuena Subgroup (Salta Group): Andina Basin, Argentina | 323 |
| <i>R.M. Palma</i> | |
| Chapter 28 | |
| Late Cretaceous–Early Tertiary Continental and Lacustrine Basins of Hong Kong and Southeast China | 329 |
| <i>R.B. Owen</i> | |
| Chapter 29 | |
| Upper Cretaceous–Cenozoic Lacustrine Deposits of the Zaysan Basin, Eastern Kazakhstan | 335 |
| <i>S.G. Lucas, R.J. Emry, V. Chkhikvadze, B. Bayshashov, L.A. Tyutkova, P.A. Tleuberdina, and A. Zhamangara</i> | |
| Section VI Eocene | |
| Chapter 30 | |
| Late Bartonian (Eocene) Lacustrine Limestone of the Touraine Basin, France | 343 |
| <i>L. Rasplus and F. Ménéillet</i> | |
| Chapter 31 | |
| Lacustrine Limestones and Tufas in the Chadron Formation (Late Eocene), Badlands of South Dakota, U.S.A. | 349 |
| <i>J.E. Evans and L.C. Welzenbach</i> | |
| Chapter 32 | |
| Lacustrine Facies in an Eocene Wrench-Fault Step-Over Basin, Cascade Range, Washington, U.S.A. | 359 |
| <i>J.E. Evans</i> | |
| Chapter 33 | |
| The Upper Eocene Bembridge Limestone Formation, Hampshire Basin, England | 369 |
| <i>B. Daley, N. Edwards, and I. Armenteròs</i> | |
| Section VII Oligocene-Miocene | |
| Chapter 34 | |
| Lacustrine Oligocene Basins in Southern Provence, France | 381 |
| <i>D. Nury</i> | |
| Chapter 35 | |
| The Calcaire du Berry, Paris Basin, France | 389 |
| <i>F. Ménéillet and L. Rasplus</i> | |
| Chapter 36 | |
| Neogene Lacustrine Deposits of the North-Central Ebro Basin, Northeastern Spain | 395 |
| <i>C. Arenas and G. Pardo</i> | |

| | |
|---|-----|
| Chapter 37 | |
| Sedimentology and Evolution of a Paleogene-Neogene Shallow Carbonate Lacustrine System, Ebro Basin, Northeastern Spain | 407 |
| <i>A. Luzón and A. González</i> | |
| Chapter 38 | |
| The Oligocene-Miocene Calcaires de Beauce (Beauce Limestones), Paris Basin, France | 417 |
| <i>F. Mènillet and N. Edwards</i> | |
| Chapter 39 | |
| Upper Eocene and Oligocene Lacustrine Deposits of the Southwestern United States, with Emphasis on the Creede and Florissant Formations | 425 |
| <i>D. Larsen</i> | |
| Section VIII Miocene-Pliocene | |
| Chapter 40 | |
| The Middle Miocene Son Verdera Lacustrine-Palustrine System (Santa Margalida Basin, Mallorca) | 441 |
| <i>E. Ramos-Guerrero, I. Berrio, J.J. Fornós, and L. Moragues</i> | |
| Chapter 41 | |
| Alluvial and Lacustrine Facies of the Yeniçubuk Formation (Lower-Middle Miocene), Upper Kizilirmak Basin, Türkiye (Turkey) | 449 |
| <i>I. Türkmen and I.E. Kerey</i> | |
| Chapter 42 | |
| Miocene and Pliocene Diatomaceous Lacustrine Sediments of the Tugen Hills, Baringo District, Central Kenya Rift | 465 |
| <i>R.B. Owen and R.W. Renaut</i> | |
| Chapter 43 | |
| The Shanwang Basin (Miocene) in Shandong Province, Eastern China | 473 |
| <i>Hong Yang</i> | |
| Chapter 44 | |
| Miocene-Pliocene Lacustrine and Marginal Lacustrine Sequences of the Furnace Creek Formation, Furnace Creek and Central Death Valley Basins, Death Valley Region, U.S.A. | 481 |
| <i>L.H. Tanner</i> | |
| Chapter 45 | |
| Northern Teruel Graben (Neogene), Northeastern Spain | 491 |
| <i>A.M. Alonso-Zarza, J.P. Calvo, J. van Dam, and L. Alcalá</i> | |
| Chapter 46 | |
| Neogene Lacustrine Systems of the Southern Teruel Graben (Spain) | 497 |
| <i>P. Anadón, F. Ortí, and L. Rosell</i> | |
| Chapter 47 | |
| Pliocene Lacustrine Deposits of the Tiberino Basin (Umbria, Central Italy) | 505 |
| <i>G. Basilici</i> | |
| Section IX Quaternary | |
| Chapter 48 | |
| Pleistocene Carbonate Lacustrine Deposits: Sulmona Basin (Central Apennines, Italy) | 517 |
| <i>G.P. Cavinato and E. Miccadei</i> | |

| | |
|--|-----|
| Chapter 49 | |
| Two Lacustrine Episodes During the Late Pliocene–Holocene Evolution of the Rieti Basin (Central Apennines, Italy) | 527 |
| <i>G.P. Cavinato, E. Gliozzi, and I. Mazzini</i> | |
| Chapter 50 | |
| Floodplain Lake Deposits on an Early Pleistocene Alluvial Plain (Tiberino Basin, Central Italy) | 535 |
| <i>G. Basilici</i> | |
| Chapter 51 | |
| A Lower-Middle Pleistocene Lacustrine System in Late Evolutionary Stages of the Sant' Arcangelo Basin (Southern Italy) | 543 |
| <i>L. Sabato</i> | |
| Chapter 52 | |
| Spatial and Temporal Facies Variations in the Pleistocene Olorgesailie Formation, Southern Kenya Rift Valley | 553 |
| <i>R.B. Owen and R.W. Renaut</i> | |
| Chapter 53 | |
| Lake Baringo, Kenya Rift Valley, and its Pleistocene Precursors | 561 |
| <i>R.W. Renaut, J.-J. Tiercelin, and R.B. Owen</i> | |
| Chapter 54 | |
| The Laguna de Babícora Basin: A Late Quaternary Paleolake in Northwestern Mexico . . . | 569 |
| <i>J. Ortega-Ramírez, J. Urrutia-Fucugauchi, and A. Valiente-Banuet</i> | |
| Chapter 55 | |
| Quaternary Lacustrine Ostracoda from Northern Patagonia: A Review | 581 |
| <i>R.C. Whatley and G.C. Cusminsky</i> | |
| Chapter 56 | |
| Late Pliocene and Pleistocene Searles Lake, California, U.S.A. | 591 |
| <i>G.I. Smith</i> | |
| Chapter 57 | |
| Sedimentology, Stratigraphy, and Hydrochemistry of Bristol Dry Lake, California, U.S.A. | 597 |
| <i>M.R. Rosen</i> | |
| Chapter 58 | |
| Limnogeology of Lake Balaton (Hungary) | 605 |
| <i>T. Cserny and E. Nagy-Bodor</i> | |
| Chapter 59 | |
| Sediment Records from Qilu Hu and Xingyun Hu, Yunnan Province, China: Late Pleistocene to Present | 619 |
| <i>M. Brenner, T.J. Whitmore, Song Xueliang, Long Ruihua, D.A. Hodell, and J.H. Curtis</i> | |
| Chapter 60 | |
| Late Quaternary Lacustrine Deposition in the Chilean Altiplano (18°–28°S) | 625 |
| <i>B.L. Valero-Garcés, M. Grosjean, B. Messerli, A. Schwalb, and K. Kelts</i> | |
| Index | 636 |