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The Marine Jurassic and Lower Cretaceous of Southern Xizang (Tibet): Bivalve Assemblages, Correlation, Paleoenvironments and Paleogeography

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A thesis submitted in fulfilment of the requirements for the Degree of Doctor of Philosophy in Geology, University of Auckland 1990
The Marine Jurassic and Lower Cretaceous of Southern Xizang (Tibet):
Bivalve Assemblages, Correlation, Paleoenvironments and Paleogeography

(abstract)

This study is based on 15 measured Jurassic to Lower Cretaceous sections and their abundant bivalve faunas distributed mainly in the Nyalam and Gamba districts of southern Xizang. It addresses the establishment of bivalve assemblages, stratigraphic subdivision and correlation, analysis of sedimentary environments, sea-level change and paleogeography in light of the tectonic framework and geological evolution of the Xizang Plateau.

The Plateau consists of three terranes: Qangtang, Gangdisé and Himalaya. They are separated by the sutures: Kunlun-Hoh Xil-Jingsha Jiang, Banggong Co-Nu Jiang, and Yarlu Zangbo Jiang, which represent three closed oceans: Paleo-Tethys, Neo-Tethys and South Xizang Sea. Stratigraphic development of the Jurassic and Lower Cretaceous of southern Xizang is especially closely related to the evolution of the South Xizang Sea.

Bivalves are one of the most common and important Jurassic and Early Cretaceous fossil groups in the Plateau. From 15 measured sections, 51 bivalve species within 26 genera are described, including 3 new genera and 14 new species.

New genera: Vanustus, Yoldioides, Antipectenoides
New species: Nuculoma oriens (Nuculidae) Yoldioides juranoides (Malletiidae) Mesosaccella gangbaensis (Nuculanidae) M. oriena Grammatodon (Indogrammatodon) sinensis (Paralleloidontidae) Oxytoma jiabulensis (Oxytomidae) Meleagrinella minima M. dongshangensis M. sinensis Entoliium dongshangensis (Entoliidae) Antipectenoides sinensis Ctenoides shizangensis (Limidae) Anisocardia shizangensis (Arcticidae) Protodiceras lanonglaensis (Megalodontidae)

A stratigraphic sequence of ten different bivalve assemblages and four Buchia faunas from the Jurassic to Lower Cretaceous of Nyalam district, and four Jurassic bivalve faunas from the Gamba district are recognised. In addition, the Oxytoma jiabulensis bed and two Meleagrinella beds are also recognised.

These assemblages can be seen to be of two types, high and low diversity, indicating different sedimentary environments. These assemblages along with co-existing ammonites also provide a good basis for stratigraphic division and correlation of the sequences.
Special attention is given to nomenclatural and other problems associated with the important genus *Buchia*. *Australobuchia* Zakharov is believed to be inseparable generically, and some Xizang species of *Buchia* are placed in synonymy. On this basis the evolution and migration of the genus is discussed.

From measured sections in southern Xizang, a comparatively complete Jurassic-Lower Cretaceous sequence has been established, which includes six formations: (in ascending order) *Pupugar*, *Nieniexiongla*, *Lanongla*, *Menbu*, *Xuomo* and *Gucocun* Formations. A new stratigraphic unit, the Gangdong Formation, is established, for Mid-Upper Jurassic strata of the Gamba district. Direct and indirect biostratigraphic correlation within China and between southern Xizang and other places around Gondwanaland is well established.

Lithologic features, sedimentary structures and bivalve assemblages allow four environments including nine lithofacies to be recognised in southern Xizang:

1. Inner shelf environment  
   1] Shoreface sandstone facies  
   2] Neritic terrigenous clastic facies  
   3] Open shelf carbonate facies  
   4] Protected barrier carbonate facies  
   5] Reef limestone facies  
2. Outer shelf environment  
   6] Siltstone-shale-carbonate facies  
3. Slope environment  
   7] Fine clastic facies  
   8] Pelagic limestone facies  
4. Bathyal environment  
   9] Dark Buchia-ammonite-lutite facies

They can be seen to be organised into sedimentary cycles, which clearly show a huge transgression with three peaks in the Upper Jurassic reaching a maximum at the top of the Jurassic (Upper Tithonian). In the Lower and Middle Jurassic, sea-level changes fluctuated between coastal and shelf-sea environments, whereas in the Upper Jurassic, as a result of sea-floor spreading in the South Xizang Sea and the formation of fault basins, the area descended into bathyal depths.

Paleogeographically, the northern part of the Plateau (i.e. the Northern Branch, or Neo-Tethys) underwent a shallowing process along with areal extension during Jurassic times, but shrank in the Early Cretaceous, whereas in the Southern Branch, during Jurassic-Early Cretaceous times, the South Xizang Sea developed a wide variety of sedimentary environments, including inner and outer shelf sea, continental slope and bathyal fault basin.
Acknowledgements

This thesis is based on materials collected from southern Xizang (Tibet), during the 1980-1981 expedition of the Qinghai-Xizang Plateau Geological Survey Party of the Ministry of Geology and Mineral Resources of China. I am grateful for the opportunity to have taken part in this expedition and for their assistance with funds.

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# Table of Contents

<table>
<thead>
<tr>
<th>Chapter I Introduction</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chapter II Tectonic Setting of Xizang Plateau and Review of the Geology of Southern Xizang</td>
<td>5</td>
</tr>
<tr>
<td>2-1 Tectonic framework of Xizang Plateau and the Tethys</td>
<td>5</td>
</tr>
<tr>
<td>2-2 Three Seas -- Three sutures</td>
<td>8</td>
</tr>
<tr>
<td>2-3 Tectonic evolution of the Xizang Plateau</td>
<td>11</td>
</tr>
<tr>
<td>2-4 Jurassic and Lower Cretaceous tectonic sedimentary features in southern Xizang</td>
<td>14</td>
</tr>
<tr>
<td>1] Himalayan region</td>
<td>14</td>
</tr>
<tr>
<td>2] Yarlu Zangbo region</td>
<td>15</td>
</tr>
<tr>
<td>Chapter III General Description of Measured Sections</td>
<td>17</td>
</tr>
<tr>
<td>3-1 Himalayan Region</td>
<td>17</td>
</tr>
<tr>
<td>1] Pupugar Section</td>
<td>17</td>
</tr>
<tr>
<td>2] Menbu Section</td>
<td>20</td>
</tr>
<tr>
<td>3] Lanongla Section</td>
<td>21</td>
</tr>
<tr>
<td>4] Guco Section</td>
<td>23</td>
</tr>
<tr>
<td>5] Dongshan Section</td>
<td>26</td>
</tr>
<tr>
<td>6] Supplementary Dongshan Section</td>
<td>27</td>
</tr>
<tr>
<td>7] Pusela Section</td>
<td>27</td>
</tr>
<tr>
<td>8] Taixingqu Section</td>
<td>28</td>
</tr>
<tr>
<td>9] Dusobeshan Section</td>
<td>28</td>
</tr>
<tr>
<td>10] Jiulongla Section</td>
<td>29</td>
</tr>
<tr>
<td>3-2 Yarlung Zangbo Region</td>
<td>30</td>
</tr>
<tr>
<td>11] Tianba Section</td>
<td>30</td>
</tr>
<tr>
<td>12] Jiabula Section</td>
<td>32</td>
</tr>
<tr>
<td>13] Weimai Section</td>
<td>33</td>
</tr>
<tr>
<td>14] Yangzho Yum Co area</td>
<td>34</td>
</tr>
<tr>
<td>15] Sajia Section</td>
<td>35</td>
</tr>
<tr>
<td>Chapter IV Bivalve Systematics</td>
<td>36</td>
</tr>
<tr>
<td>4-1 Nuculoma</td>
<td>36</td>
</tr>
<tr>
<td>4-2 Vanusta</td>
<td>37</td>
</tr>
</tbody>
</table>
4-3 Yoldioides
4-4 Mesosaccella
4-5 Grammatodon (Indogrammatodon)
4-6 Modiolus
4-7 Inoceramus
4-8 Mytiloides
4-9 Retroceramus
4-10 Oxytoma
4-11 Meleagrinella
4-12 Entolium
4-13 Camptonectes (Camptonectes)
4-14 Camptonectes (Maclearnia)
4-15 Antipectenoides
4-16 Praebuchia
4-17 Buchia
4-18 Ctenoides
4-19 Plagiostoma
4-20 Trigonia
4-21 Astarte
4-22 Astartoides
4-23 Anisocardia
4-24 Eocallista
4-25 Protodiceras
4-26 Thracia (Thracia)

Chapter V Jurassic and Lower Cretaceous Bivalve Assemblages
in Southern Xizang

5-1 Nyalam District

1) Lower Jurassic
   Assemblage 1: Astarte delicata-Entolium nienxielonglaensis
   Assemblage 2: Weyla ambongoensis-Trigoniacea

2) Middle Jurassic
   Assemblage 3: Trigonia kenti-Entolium disciformis
   Assemblage 4: Entolium demissum
   Assemblage 5: Posidonia ornati-Modiolus imbricatus-grammatodon
                 (Indogrammatodon) virgatus

3) Upper Jurassic
Chapter VI

Genus Buchia

6-1 Buchia or Australobuchia?
6-2 Buchia species in southern Xizang
6-3 Possible evolutionary relations
6-4 Bipolar distribution
6-5 The migration of Buchia

Chapter VII

Jurassic and Lower Cretaceous Stratigraphic Divisions

7-1 Jurassic Stages
7-2 Jurassic-Lower Cretaceous system in the Himalayan Region
   1] Lower Jurassic
   2] Middle Jurassic
   3] Upper Jurassic
   4] Lower Cretaceous
### Chapter VIII Marine Jurassic and Lower Cretaceous Biostratigraphy

#### 8-1 Correlation within China
1. Lower Jurassic
2. Middle Jurassic
3. Upper Jurassic
4. Lower Cretaceous

#### 8-2 International correlation
1. India
2. Arabian Peninsula
3. East and North Africa
4. Southeast Asia
5. Indonesia
6. Western Australia
7. Papua New Guinea
8. New Zealand and New Caledonia
9. Argentina and Chile
10. Antarctica

### Chapter IX Sedimentary Environments

#### 9-1 Inner shelf environment
1. Shoreface sandstone facies
2. Neritic terrigenous clastic facies
3. Open shelf carbonate facies
4. Protected barrier carbonate facies
5. Reef limestone facies

#### 9-2 Outer shelf environment
6. Siltstone-shale-carbonate facies

#### 9-3 Slope environment
7. Fine clastic facies
8. Pelagic limestone facies

#### 9-4 Bathyal environment
9. Dark *Buchia*-ammonite-lutite facies

### Chapter X Sedimentation Cycles and Eustatic Sea-level Changes
Chapter XI Outline of the Jurassic and Lower Cretaceous

10-1 Comparisons and choice of methods
10-2 Sedimentary cycles and eustatic sea-level changes in southern Xizang
   1] Lower Jurassic
   2] Middle Jurassic
   3] Upper Jurassic
   4] Lower Cretaceous
10-3 Cyclic accumulation rates
10-4 Causes of eustatic sea-level changes

Chapter XI Outline of the Jurassic and Lower Cretaceous

Paleogeography of Xizang

11-1 Early Jurassic
11-2 Middle Jurassic
11-3 Late Jurassic
11-4 Lower Cretaceous

Chapter XII Conclusions

12-1 Faunal diversity, a depositional environment indicator
12-2 The genus *Buchia*
12-3 Stratigraphy
12-4 Sedimentary environments
12-5 Eustatic sea-level changes
12-6 Paleogeography

References

Fossil Plates
List of Tables

<table>
<thead>
<tr>
<th>Table no.</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-1</td>
<td>Comparison of tectonic movements in the Xizang Plateau and Laurasia</td>
<td>8</td>
</tr>
<tr>
<td>2-2</td>
<td>Comparison of ophiolite zones on the northern and southern sides</td>
<td>9</td>
</tr>
<tr>
<td>2-3</td>
<td>Features of terranes in the Xizang Plateau</td>
<td>10</td>
</tr>
<tr>
<td>2-4</td>
<td>Evolution of sutures in the Xizang Plateau</td>
<td>11</td>
</tr>
<tr>
<td>4-1</td>
<td>List of Jurassic and Lower Cretaceous bivalve species from southern Xizang</td>
<td>81-86</td>
</tr>
<tr>
<td>5-1</td>
<td>Jurassic and Lower Cretaceous bivalve assemblages of southern Xizang</td>
<td>88</td>
</tr>
<tr>
<td>5-2</td>
<td>Comparison of Meleagrinella beds of southern Xizang</td>
<td>101</td>
</tr>
<tr>
<td>6-1</td>
<td>List of Buchia faunas from southern Xizang</td>
<td>104</td>
</tr>
<tr>
<td>6-2</td>
<td>Morphologic features of Buchia and related genera</td>
<td>111</td>
</tr>
<tr>
<td>6-3</td>
<td>Morphologic features of Buchia species in southern Xizang</td>
<td>115</td>
</tr>
<tr>
<td>7-1</td>
<td>Jurassic stages and their duration</td>
<td>123</td>
</tr>
<tr>
<td>7-2</td>
<td>Ammonites of southern Xizang and comparison with European ammonite zones</td>
<td>124</td>
</tr>
<tr>
<td>7-3</td>
<td>Evolution of Jurassic lithostratigraphic nomenclature of the Nyalam district</td>
<td>127</td>
</tr>
<tr>
<td>7-4</td>
<td>Evolution of Mid-Upper Jurassic-Lower Cretaceous lithostratigraphic nomenclature of the Gamba district</td>
<td>133</td>
</tr>
<tr>
<td>8-1</td>
<td>Jurassic-Lower Cretaceous stratigraphic correlation in southern Xizang</td>
<td>136</td>
</tr>
<tr>
<td>8-2</td>
<td>Marine Jurassic-Lower Cretaceous stratigraphic correlation within China</td>
<td>138</td>
</tr>
<tr>
<td>8-3</td>
<td>Marine Jurassic-Lower Cretaceous stratigraphic correlation in part of peri-Gondwana region</td>
<td>145</td>
</tr>
<tr>
<td>8-4</td>
<td>Subdivision of the Jurassic and characteristic fossils of the Spiti area</td>
<td>146</td>
</tr>
<tr>
<td>8-5</td>
<td>Subdivision of the Jurassic and characteristic fossils of the Kutch area</td>
<td>147</td>
</tr>
<tr>
<td>8-6</td>
<td>Characteristic Jurassic fossils of Saudi Arabia</td>
<td>150</td>
</tr>
<tr>
<td>8-7</td>
<td>Characteristic Jurassic fossils of Ethiopia</td>
<td>152</td>
</tr>
<tr>
<td>8-8</td>
<td>Jurassic fossils of the Southeast Asia</td>
<td>156</td>
</tr>
<tr>
<td>8-9</td>
<td>Characteristic Jurassic fossils of Indonesia</td>
<td>159</td>
</tr>
<tr>
<td>8-10</td>
<td>Jurassic fossils of West Australia</td>
<td>161</td>
</tr>
<tr>
<td>8-11</td>
<td>Jurassic ammonites of New Zealand</td>
<td>164</td>
</tr>
<tr>
<td>8-12</td>
<td>Ranges of characteristic bivalves and belemnites</td>
<td></td>
</tr>
</tbody>
</table>
in the New Zealand Jurassic
8-13 Jurassic ammonites of Argentina and Chile
8-14 Jurassic ammonites and bivalves of the Antarctic Peninsula
11-1 Evolution of Jurassic-Lower Cretaceous sedimentary basins in Xizang (Tibet)

List of Illustrations

Figure no. | Page
---|---
1-1 Regional map and location of sections | 2
2-1 Tectonic divisions and geographic setting of Xizang | 6
2-2 Late Triassic-Early Jurassic reconstruction of Pangaea and Tethys | 12
2-3 Tectonic evolutionary model for the Xizang Plateau | 13
3-1 Pupugar and Menbu sections | 18
3-2 Lanongla section | 21
3-3 Guco section | 23
3-4 Dongshan section | 25
3-5 Pusela section | 28
3-6 Jiulongla section | 29
3-7 Tianba and Jiabula sections | 31
3-8 Weimai section | 33
3-9 Sajia section | 35
4-1 Ctenolium of *Oxytoma jiabulensis* | 50
4-2 Hinge structure of *Meleagrinella sinensis* | 52
4-3 *Buchia leguminosa* | 70
4-4 Hinge structure of *Anisocardia shizangensis* | 77
6-1 Hinge structure of *Buchia* | 105
6-2 Comparison of ligament area in some *Buchia* species | 107
6-3 Comparison of hinge structures of *Buchia* and related genera | 109
6-4 Evolution of *Buchia* and related genera | 116
6-5 Distribution of the genus *Buchia* | 119
6-6 Stratigraphic and geographic distribution of *Buchia, Praebuchia* and *Malayomaorica* | 121
7-1 Correlation of Jurassic-Lower Cretaceous stratigraphic columns of the Nyalam district | 126
7-2 Composite Jurassic-Lower Cretaceous stratigraphic column | 127
of the Nyalam district

8-1 Localities for Jurassic stratigraphic correlation with southern Xizang

154

8-2 Distribution of Jurassic strata in southeastern Asia

155

9-1 Model for near- and off-shore marine facies

172

9-2 Columnar sequence for the neritic terrigenous clastic facies

175

9-3 Columnar sequence for the open shelf carbonate facies

179

9-4 Columnar sequence for the protected barrier carbonate facies

181

9-5 Model for Jurassic reef mound deposits in southern Xizang

183

9-6 Columnar sequence for the siltstone-shale-carbonate facies

188

9-7 Columnar sequence for the fine clastic facies

190

9-8 Columnar sequence for the pelagic limestone facies

193

9-9 Columnar sequence for the dark Buchia-ammonite-lutite facies

198

9-10 Formation of fault basins in the Tethys during Jurassic time

201

10-1 Illustration of the terms used in sequence stratigraphy

204

10-2 Eustatic curves for the Phanerozoic

206

10-3 Facies changes in a vertical sequence indicative of transgressive and regressive events

207

10-4 Jurassic sedimentary cyclics for southern Xizang

209-210

10-5 Diagrams of sea-level changes through time in eustatic cycles

208

10-6 Comparison of proposed Jurassic eustatic sea-level curves

213

10-7 Jurassic transgressive-regressive trends and accumulation rates

217

10-8 Relationships of eustacy, geosynclines, transgressions and orogenies

219

11-1 Paleogeographic map for the Early Jurassic of Xizang

222

11-2 Paleogeographic map for the Middle Jurassic of Xizang

225

11-3 Paleogeographic map for the Late Jurassic of Xizang

227

11-4 Paleogeographic map for the Early Cretaceous of Xizang

229

List of photographs

9-1 quartzose sandstone

Page No.

173

9-2 medium scale cross-bedding

173

9-3 interstratified sandstone and shale (Middle Jurassic)

174

9-4 plant fragments in sandstone

176

9-5 biomicrite

177

List of photographs

Page No.
<table>
<thead>
<tr>
<th>Page</th>
<th>Text</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>9-6</td>
<td>biomicrite</td>
<td>177</td>
</tr>
<tr>
<td>9-7</td>
<td>shell-bed in limestone</td>
<td>178</td>
</tr>
<tr>
<td>9-8</td>
<td><em>Oxytoma</em> shell-bed</td>
<td>178</td>
</tr>
<tr>
<td>9-9</td>
<td>&quot;leopard&quot; limestone</td>
<td>180</td>
</tr>
<tr>
<td>9-10</td>
<td>ripple marks in tidal flat</td>
<td>182</td>
</tr>
<tr>
<td>9-11</td>
<td>fore-reef talus</td>
<td>184</td>
</tr>
<tr>
<td>9-12</td>
<td>bioclastic limestone</td>
<td>184</td>
</tr>
<tr>
<td>9-13</td>
<td>bioclastic limestone</td>
<td>185</td>
</tr>
<tr>
<td>9-14</td>
<td>biomicrite</td>
<td>185</td>
</tr>
<tr>
<td>9-15</td>
<td>reef-builder Stromatoporoida (?<em>Actinostromaria</em> sp.)</td>
<td>186</td>
</tr>
<tr>
<td>9-16</td>
<td>shell-bed in reefal limestone facies</td>
<td>186</td>
</tr>
<tr>
<td>9-17</td>
<td>bioturbated bedding</td>
<td>189</td>
</tr>
<tr>
<td>9-18</td>
<td>minor-small scale cross-bedding</td>
<td>191</td>
</tr>
<tr>
<td>9-19</td>
<td><em>Entolium</em> shell-bed</td>
<td>191</td>
</tr>
<tr>
<td>9-20</td>
<td><em>Meleagrinella</em> shell-bed</td>
<td>192</td>
</tr>
<tr>
<td>9-21</td>
<td>&quot;wall-like limestone&quot;--pelagic limestone facies</td>
<td>194</td>
</tr>
<tr>
<td>9-22</td>
<td>pinkish crinoids limestone</td>
<td>194</td>
</tr>
<tr>
<td>9-23</td>
<td>trace fossil (<em>Parachondrites</em> sp.)</td>
<td>195</td>
</tr>
<tr>
<td>9-24</td>
<td>trace fossil (<em>Planolites</em> sp.)</td>
<td>195</td>
</tr>
<tr>
<td>9-25</td>
<td>angular discordance</td>
<td>196</td>
</tr>
<tr>
<td>9-26</td>
<td>argillaceous concretion with gastropods as core</td>
<td>199</td>
</tr>
<tr>
<td>9-27</td>
<td>ferruginous concretion with ammonites and bivalves as core</td>
<td>199</td>
</tr>
<tr>
<td>9-28</td>
<td>gregarious Buchia of the Upper Jurassic</td>
<td>200</td>
</tr>
<tr>
<td>9-29</td>
<td>aquagene dike in deep water sediments</td>
<td>200</td>
</tr>
</tbody>
</table>