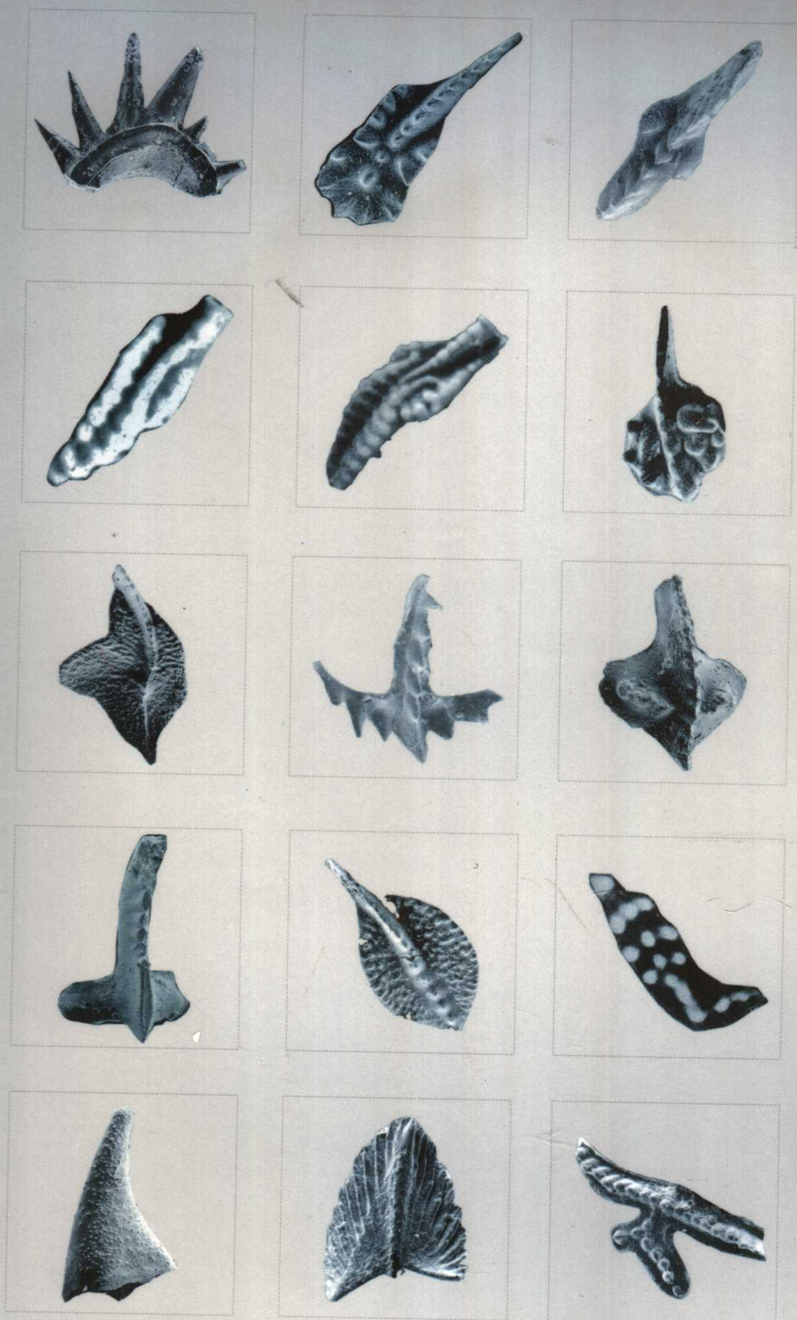

云南牙形类动物群

——相关生物地层及生物地理区研究

董致中　王　伟　编著

云南出版集团公司
云南科技出版社

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云南省地质矿产勘查开发局
云　南　省　地　质　调　查　院　资助
云南省学术著作出版基金委员会

云南出版集团公司
云南科技出版社
·昆　明·

图书在版编目（C I P）数据

云南牙形类动物群/董致中，王伟编著. —昆明：云南科技出版社，2003. 11
ISBN 7－5416－1903－5

Ⅰ. 云... Ⅱ. ①董...②王... Ⅲ. 古生代—牙形石—研究—云南省 Ⅳ. Q911. 64

中国版本图书馆 CIP 数据核字(2003)第 091428 号

云南出版集团公司
云南科技出版社出版发行
（昆明市环城西路 609 号云南新闻出版大楼　邮政编码:650034）
云南省地质矿产勘查开发局印刷厂印刷　全国新华书店经销
开本：787mm×1092mm　1/16　印张：22. 875　附图：46　字数:590 千字
2006 年 12 月第 1 版　　2006 年 12 月第 1 次印刷
印数：1～1000　　定价：88. 00 元

前　言

本书是1975～2003年期间所开展的1:20万、1:5万、1:25万区域地质调查工作中所测制的200多条牙形石生物地层剖面（包含少量外系统所测制的剖面）及众多的牙形石点，所获得的寒武纪至三叠纪7个地质时代，牙形石动物群与其相关生物地层以及有关本区牙形石生物地理区系方面的一次系统、综合性总结成果，是云南省科委、云南省地质矿产勘查开发局科技发展基金委员会批准资助出版的研究项目。在后期工作中，在经费上还得到云南省地质调查院、区调队以及北京大学刘剑波研究项目的部分资助。本项目自始至终得到云南省地质矿产勘查开发局、区调队、地质调查院及区调所以及滇黔桂石油研究院的有关领导的关心和支持，由于有他们的大力扶持和帮助，研究者才得以把近30年来一点一滴积累起来的实际资料和成果总结成册奉献给广大的区调地质工作者。特别是本书的第一作者，在近30年的牙形石工作生涯中，勤勤恳恳，不知花费了多少时间和精力，一心倾注于牙形石事业之中，临近退休时，总想如果退休前不把这些零散的分散于云南东、西、南、北不同图幅、不同剖面、不同代号的牙形石标本和成果汇集起来，进行系统归纳总结，那么退休后这些十分珍贵的实际素材就会渐渐流失，难以再行归纳。但如果能够抽点时间和精力把它总结成册，无疑对广大区调地质工作者是大有用处的，也是对伟大祖国的一种报答和奉献。而今作为第一作者来说，在退休前终于能与后继者一道将一份用心血凝聚的礼物，工作事业中的成果留给后人，为后人做点有益之事，了却了自己的心愿，委实感到万分欣慰了。因此，首先要谢谢关怀过本工种、本研究项目的首长和领导以及实验鉴定室的历届负责人，谢谢他们在工作中的扶持、肯定和鼓励并多次授予的先进生产工作者、双文明先进个人及其他一切奖励，同时要谢谢不吝帮助本项目的诸位朋友。

我们从其后各章节所论述的资料可以看出，本项目的实际素材和资料是非常丰富的，这是近30多年来点点滴滴积累起来的资料和成果，在这么多的实际素材中，既凝聚着研究者的心血，又凝聚着广大区调工作者的心血，因此还要感谢当时所属区调分队的各位负责人以及提供实际资料的各区调分队的有关工作者及参与牙形石分析、挑样的所有工作人员，由于有他们的参与、大力支持和帮助，工作才得以顺利进行。还要感谢本研究项目的顾问王成源

和王志浩研究员，秦德厚、张远志、薛玺会、熊家镛、王义昭、彭兴阶、李文昌等教授、高级工程师，以及云南省地质矿产勘查开发局、云南省科委所聘的评审专家，在成文及评审过程中提出了许多宝贵意见和学术指导；借此机会还要特别感谢范承钧、张翼飞、颜景耀、丁俊、施兴勤等总工程师，王自廉、杨国梁、周存会、刘晓林、施其宝、陈昆宏等云南省区调队队长和书记，以及王涛、包刚、曹德斌、胡长寿、段向东、刘发刚、冯明刚、张世涛、洪祥泽、胡建军、严城民、张志斌、李静、李宗亮等各级负责人及区调所职工，他们从不同的角度对本工种、本项目所给予的关爱、大力支持和帮助。

在资料收集和成文过程中承蒙北京地质科学院侯鸿飞、王仕涛、王增吉、姚建新、田树刚等研究员，南京古生物研究所金玉玕、王成源、王志浩等研究员，北京大学安太庠、白顺良、杨守仁、刘剑波、郝维城教授，北京地矿部姜建军博士后，中国科学院王念忠研究员，滇黔桂石油研究院钟端研究员，中国地质博物馆季强研究员和韩迎健高级工程师，以及德国的 W. Zigler 教授、美国的 B. Rexroad、M. Ritter 博士和教授及许多国外朋友（见英文摘要），均为本文提供了许多宝贵资料，使研究者受益匪浅。本项目承蒙杨宁昌、易凤凰牙形石电子扫描照相，冯文杰、彭程、夏贵光在资料整理过程中也帮了不少忙。在此谨向以上各单位领导、各位专家及同事与同行们再次表示我们的诚挚谢意。

由于云南横跨 2 个不同地层区，即东部华南地层区和西部保山地层区（康滇地层区的云南部分）。在构造上也属不同构造单元的板、地块，华南板块和保山地块（相当于滇、缅、马地块的云南部分）。本书通过古生代和三叠纪牙形石生物地层的研究，树立了 2 个不同地层区、不同地层系统的牙形石生物地层框架；本书应用地层清理后的最新岩石地层单位及全国地层委员会所启用的最新年代地层系统与国际最新年代地层表接轨，把本区的牙形石动物群及生物地层与国内外同期地层及牙形石动物群作了对比；本书根据国际地科联地层委员会所规定的，其中用牙形石作为首要门类来划分的，目前在云南所反映的几条地层界线也到野外做了采样并在本书中作了讨论；本书根据牙形石在各板、地块的分布情况，结合古地磁、古气候资料，在前人研究的基础上，根据研究者最新收集的大量实际素材，结合研究者的见解，论证了云南板、地块的配置格局及牙形石生物地理区，讨论了几个主要板、地块的相对运动和历史演变；本书对早二叠世萨克马尔期冰期时期在保山地块所形成的冰川作用的成因作了较详细的探讨。通过以上的研究和总结，从而为解决云南重大基础地质问题提供了机理证据，成果源于实践，服务于第一线，具有十分重要的实用价值。

在云南，用肉眼能够鉴定的古生物化石，也即人们所称谓的大化石，已有近百年的研究历史，很多门类的化石研究程度还很高，也有许多论著出版问世，但地质历程长（寒武纪至三叠纪），具有重要地层价值的牙形类动物群的研究工作，20世纪70年代以前在云南还是空白，通过近30年区调工作的实践和应用，通过本书的系统总结，总算填补了云南这一空白，这也是将牙形石与地层学结合起来应用的一种尝试。

本研究项目完成后，经云南省地质矿产勘查开发局科技处及云南省科委组织有关专家、教授的两次评审，得到了较高的评价，并同意公开出版。一致认为本书是一部具有重要学术价值的生物地层学和古生物学专著，认为本书解决了不少疑难地层问题，它不仅在生产上能划分对比地层，也是地质填图报告编写的好帮手，具有重大的科学实用价值，它综合反映了云南省地质、石油、矿山及教学等系统近30年来牙形石的研究成果，填补了云南省有关这方面的空白，若干部分已与国际接轨，接近国内外先进水平。认为本书对于科研、教学、生产单位的地质工作者具有重要的参考价值和实用价值。

当然，此次总结和研究，仅属于阶段性总结研究成果，还有许许多多余留问题，特别是类似第二章有关学术探讨部分，是根据目前研究者所掌握的现有资料，根据研究者的见解所得出的结论，因此还有待后人在今后的实践工作中去收集、集累更多更丰富的实际素材，去论证和加以补充、挖掘、充实和完善。地学也是一门科学，科学的发展总是无止境的，随着研究程度的加深，也许目前认为正确的东西、新的东西，今后又会被更新的东西所代替。而且在学术方面，同样的事物，根据不同学者掌握和拥有实际资料的不同，也可能会得出不同的认识和见解，研究者认为这是正常的。只有不同学者根据自己所掌握的现有资料，各抒己见，从不同的角度去探讨、挖掘和研究，科学也才会得以深化和发展。

最后要说明的是，本书其编写的动机，主要是针对广大地质调查工作者的，因此在绪论部分和每一章的概述部分，用了少量的言词，对每个地质时代的牙形石及其用途作了一些通俗简要的介绍。诚然，这对于广大地质工作者来说是适用的，而对于牙形石的同行来说，这些话语也许是多余的。

限于水平，本书错漏难免，可能还会有许多谬误，如有不当之处，敬请各位专家、学者批评指正！

编著者

The Cambrian – Triassic Conodont faunas in Yunnan, China

——correlative biostratigraphy and the study of palaeobiogeographic province of conodont

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This works is the systematic and comprehensive summing – up of the conodont fauna of 7 geological ages from Cambrian to Triassic and biostratigraphy, which were collected from more than 200 stratigraphic sections and at many points of conodont in 1:200000; 1:50000 and 1:250000 regional geological surveying work from 1975 to 2003 in Yunnan province. The section name, measurer's unit and identifiers of conodont are shown in the table 1 – 1 and the sections are described in chapter 7. Because of the limitation of the space, only a few representative sections are introduced in this works. The other ones can be read in the correlative reports of regional geological surveying. Then, this works is introduced in short separately in three aspects as follows.

I. The study on the biostratigraphy and boundary of conodont (and conodont succession)

1. Setting the basic biostratigraphic framework of conodont from Cambrian to Triassic in Yunnan. 135 conodont zones (and subzones) or assemblage zones – – the smallest chronostratigraphic units under stage have been discovered, identified and set up, which are correlatable with the same period strata in China and abroad until the manuscript of this book is completed※. Of them, there are 5 in Cambrian; 15 in Ordovician; 43 in Silurian – Devonian; 41 in Carboniferous – Permian; 31 in Triassic (the meaning, composition and correlatability in China and abroad of every zone are described in chapter 3 ~ 6 and shown in the appendant tables of them).

2. According to the rule of International Union of Geological Sciences (International Commission on Stratigraphy), the stratigraphic boundaries, such as P/C; C2/C1; C12/C11; D3/D2; D2/D1; D/S, must be divided mainly by conodont. Therefore, we have collected densely

conodont samples at the most advantageous places and discussed them in this book.

3. And the 315 conodont gen. and sp. with important stratigraphic values are described in this book, which can be easily used and referred by the production units.

4. For the geological periods of some important and typical lithostratigraphic units with wide area, broad distribution and under debate in the past time, we re - define and discuss about them with conodont in this works, The most important ones are as follow:

a. a large area in Baoshan Massif of west Yunnan has been regarded as the area without upper Permian and lower Triassic strata for a long time. Nevertheless, by the sampling and study on the conodonts of different facies region in section 33 ~ 37, we discover that there are not only lower Triassic Olenekian sediments but also Indian stage ones, which have the complete series of conodont in this area. Therefore the Baoshan Massif is not an area without lower Triassic strata. However, the late Permian conodont has not been discovered in this area until now, which may be due to the influence of the Lancang Movement.

b. There are two lithostratigraphic units famous in China and abroad, Dingjiazhai Formation and Woniusi Formation. The lower part of the former one has been regarded as the Gondwana facies strata with cold water fauna and glacier sediments by many researchers. However, because the upper member of Dingjiazhai Formation and the strata over it has been considered to be the Triticites zone of late Carboniferous Maping Group and the lower member of Dingjiazhai Formation has been regarded as the sediment from Bashkirian to Gzhelianana of Carboniferous for a long time, it is very difficult in the correlation of them with the Gondwana facies strata. In 1980s, We discovered two conodonts with very special form in the limestone interbed of Woniusi Formation Basalt in the Woniusi section, Baoshan, which have been identified by US professor M. Ritter. They are regarded as Rabeignathus n. sp. of early Permian. At that time, because the sampling was not systematic, few conodonts were collected and they are species nova as well as many fusulinids of late Carboniferous were discovered in the same horizon, which is very different from the age of conodont, the result of these conodonts has not been used. Later, WANG Xiang - dong et al (2000) discovered Sweetognathus bucaramangus, Mesogondolella cf. bisseri, etc. identified by them in Dongshanpo section, Baoshan. Nearly at the same time, we discovered the early Permian conodonts Homeoiranognathus rexroadianus, Rabeignathus eobucarancangus, R. ritterianus, Sweetognathus SP. A, S. inornatus when we identified the samples collected from the limestone of the upper member of Dingjiazhai Formation in the Tizipo section, Yongde of 1:50000 Yongde sheet. Then, in our re - definition, the age of Woniusi Formation is from early Permian late Artinskian to middle Permian earliest Kungurian and that of the upper member of Dingjiazhai Formation is from early Permian late Sakmarian to early Artinskian. The research results of latter conodonts are consistent with the conclusion of WANG Xiang - dong, et al (2000) for the same horizon in different areas. The discovery of conodonts in Woniusi Formation provides the important evidence for the earliest departure age of Baoshan Massif from the marginal Gondwana. The vertical distribution of conodont in the section and the division of conodont zone are shown in Fig . 2 - 15.

c. There are a suite of Palaeozoic strata on the east coast of Erhai lake of Dali and the area of Binchuan, Xiangyun, which are widely distributed. They can extend northward to the area of Lugu lake and southward to the area of Jinping. They were regarded as the Silurian strata and called the Wase Group before 1960s. It was middle Silurian according to the definition before 1970s. The 1:200000 and 1:50000 regional geology surveying began in this area from 1980s. Because the conodont and tentaculitid have been systematically collected under our coordination in this area, their revised ages are from early Silurian to early Carboniferous. And the Icriodus woschmidti of Silurian bottom boundary was discovered and 10 conodont zones are identified ascensionally, ie, 1 zone in lower Silurian, 2 zones in middle Silurian, 3 zones in upper Silurian, 4 zones in Devonian. The middle – upper Devonian strata are a suite of siliceous sediments. Their age can be identified by conodont but the conodont zone has not been set now.

d. The Triassic Falang Formation is distributed very widely in the east area. Its geological age has been considered to be middle Triassic. In the later systematic study of conodont samples, not only the complete middle Triassic but also the late Triassic Carnian stage conodont succession is discovered.

Besides these typical examples mentioned above, there are many other strata redefined with conodonts.

Ⅱ. The discussion about the biogeographic area division, the relationship between conodont and Tethys, and the palaeogeographic position of the plate and massif in this area.

1. In the process of this systematic sum – up work, based on the map of Cambrian – Triassic palaeoplate in the "The Geography of Fossil Organism in China" by YIN Hong – fu, et al (1988), other relative information of palaeoplate by writers in China and abroad (cf. references) and the recent palaeomagnetic information of a few plate – massifs in Yunnan, we have adjusted the position of main plates and massifs in Yunnan (fig 2 – 2 ~ fig 2 – 8). We plot our conodont information on the map of palaeoplate (with thin black dots) and find an interesting phenomenon, ie, the most conodonts of Silurian – Triassic are distributed closely in the Tethys realm, which is the palaeobiogeographic realm of YIN Hong – fu, et al (1988) mentioned above (the area outlined with line of dashes in fig from 2 – 4 ~ 2 – 8). In other words, conodonts are distributed mainly in the area with the palaeolatitude ranged from 0° ~ 30° between the south of equator and the north of equator, which is more or less consistent with the present tropical and subtropical zones of China.

As we know, the meanings of Tethys consist of two aspects in palaeobiogeography and tectonics. Briefly, the palaeobiogeographic meanings of Tethys are as follows: ① It means an ocean extended nearly east – westward in tropical – subtropical zones between Laurasia and Gondwana; ② It has the fauna and sedimentary facies of tropical and subtropical Tethys type. According to the study, the various tropical and subtropical abysmal marine facies fauna and sediment formed in the continental margin and ocean of Tethys can be generally regarded as belonging to the "Tethys" type.

The above – mentioned Tethys realm of Silurian to Triassic palaeobiogeographic area series in the world divided by YIN Hong - fu, et al may derive from these meanings. Because the realm division of order one in the global palaeobiogeographic area series is controlled by the climatic zone, and Tethys realm reflects the tropical and subtropical climate, perhaps their division is reasonable. It further shows that the conodont fauna were mainly developed in Tethys from Silurian to Triassic (at least after Devonian). In other words, the conodont fauna were mainly distributed in the Tethys ocean and on its coast or in the ocean connected with Tethys in that time. A small part of them was distributed in the temperate zone and high - latitude area in the outer margin. It also shows that the conodont fauna are mostly controlled by the palaeolatitude and most of them belong to the type of Tethys.

Many scientists have more or less discussed about the palaeobiogeographic area series of this area. But nobody has a systematic study in connection with the conodont. The cosmopolitan species of conodont widely distributed in two or more biogeographic areas are abundant, which can be applied especially to the area series division of order one and two. Therefore, based on the present information, focused on the conodont and combined with other fauna, this works provides some additional viewpoints and discussions about the Cambrian - Triassic palaeobiogeographic area series in the study area, focused on the division units of order 1 (realm) and order 2 (region).

Because there is a close relationship between Tethys and conodont fauna, we emphatically discuss about two problems of the conodont fauna related to Tethys:

a. We believe that the conodont fauna are distributed in the Tethys ocean area of ocean - island alternation and their migration and interchange each other take place in the planktonic ecological area.

As is shown on the palaeoplate map of the world in various times, Tethys has an ocean - island appearance formed by wide or narrow, large or small land block and basin. This Tethys ancient ocean environment of alternative ocean and island is very suitable for the growth and development of conodont, which certainly shows different ecological environment and biofacies, ie, the planktonic facies ecological area between land blocks, the shallow water benthonic facies ecological area on the carbonate platform of land block and the transitional type ecological area between them. According to the study, there is conodont belonging to not only the shallow water platform type but also the deep water basin type. The conodont of natural planktonic type is generally distributed on the neritic carbonate platform, whereas the planktonic conodont is in the planktonic ecological area. We have discovered that many Cambrian - Triassic conodonts in this area can be correlated not only between various oldlands of Cathysian but also to the conodont of some periods in North America, Europe and Australia. These conodonts that can be distantly correlated are mainly zoned members below stage, ie, so - called the cosmopolitan or open sea type members by some researchers (shown as the table in chapter 2 ~ 6).

It shows that there is a Tethys channel for the migration and interchange of conodont each other. And we think that their interchange is occurred in the planktonic ecological area and controlled strictly by the palaeolatitude.

Ⅲ. The palaeogeographic location of several main plates and massifs of Yunnan from Cambrian to Triassic

The most practical value of the study on the geographic distribution of the fossil (including conodont) in various geological periods, ie, the palaeobiogeographic area system, is to identify the location of the palaeoplate in combination with the palaeomagnetic and palaeoclimatic studies, which can provide the strong evidences for the palaeogeographic reconstruction. Especially, Yunnan is an important composition of the Tethys orogenic zone. And it is the conjunction area of the Yunnan part of Yangzi plate belonging to the South China plate, Zhongdian massif, Lanping - Simao massif, Lancang massif and the west Baoshan massif, Tengchong massif. Moreover, the relationship between several massifs, plate in Yunnan and Gondwana continent, especially Australia, is very close in the geological period. Therefore, it is very important and significant to know the relationship between these continental blocks.

According to the recent palaeomagnetic, palaeoclimatic information of the plate and massif, the conodont distribution in these continental blocks mentioned above and its similarity or difference, this works focuses on the discussion about the palaeogeographic location from Cambrian to Triassic of the South China plate, Baoshan massif and their relationship with Gondwana in detail (cf. Fig 2 - 2 ~ 2 - 8, Fig 2 - 13 ~ 2 - 16, Tab 2 - A ~ 2 - B, Tab 2 - 1 ~ 2 - 8). The main viewpoints are as follows.

1. The North China, South China and Gondwana were located in south hemisphere in Precambrian and early Cambrian and in conjunction with each other. The evidences are their similar palaeolatitude and similar basement. South China rapidly floated southwards in middle Cambrian and reached the equator zone of south latitude 10° in middle Ordovician. Australia also floated southwards in middle Cambrian. And its west part entered the tropical area of south hemisphere in Ordovician. It is consistent with the palaeoclimate, biogeographical distribution and the conclusion of YIN Hong - fu, et al (1988), ie, there was an axis of clockwise rotation in Siberia - Australia in Cambrian - Ordovician, Siberia migrated northwards and Australia floated southwards. There was the correlated rotation in North China and South China. This situation shows that South China and Australia began to float southwards and rotate clockwise in middle Cambrian.

2. The South China plate began to detach northwards in late Ordovician. And it was located in the palaeoequator zone of south hemisphere until middle Carboniferous. It entered the north hemisphere in late Carboniferous and reached 27.5°N. . The conodont belongs to the fauna of European - American type.

3. The Lanping - Simao massif floated northwards and close followed the Yangzi continent from early Silurian to Jurassic. And it was combined with the Yangzi continent in late Triassic.

4. The Baoshan massif floated southwards from early Ordovician to the early - middle Artinskian of early Permian and was very close related to the West Australia. It turned to detachment northwards and counterclockwise when the tholeiite of Woniusi Formation erupted in late Artinskian. And it was in combination with South China plate from late Triassic to Jurassic. The late

Cambrian, early Ordovician, late Silurian and Devonian conodont fauna of this massif are similar to those in the northwest part of Australia. The early Carboniferous conodont fauna are with European – American tint. The early Permian conodont is similar to those of US, Colombia and Iran. The early Triassic conodont is similar to those of Pakistan and Mount Qomolangma. And the middle – late Triassic conodont is with strong European – American tint. This massif is without a part of conodont zone of late Devonian Famennian stage, which shows the influence of the rise of the sea level in the world. And it is without all of the late Carboniferous conodont zones and the related strata, which shows the Baoshan massif was affected by the Namurian rising at that time. The late Permian conodont has not been discovered in this massif yet. It seems that it is resulted from the influence of Lancang Movement.

5. We believe that the drift sedimentation of Dingjiazhai Formation in Baoshan massif took place in the early – middle Sakmarian stage of early Permian, which corresponds to the palaeolatitude 24.7° ~26.5°S. . If it is converted to the palaeolatitude of "normal" geological period according to Tab 2 – B, ie, take the Woniusi Formation as an united standard, it must be 34° ~5° S (mainly take the average value), which correspond to the "subtropical – warm temperate zone" in the normal geological period. Normally, there must not be the glacial sediment laterally far extended in these palaeolatitude and climate zone. However, we do not exclude such a possibility, ie, the glacial sediment of Baoshan massif was formed by the influence of the early Permian Sakmarian glacial center on Gondwana, which means that it was formed by the influence of the cold wave in the summit period of the glacier. It is not impossible. For example, Kunming of Yunnan Province, which is praised as a spring city of "no severity of winter and no intense heat of summer", can become a white field with snow 1 ~2 m thick sometimes when the strong cold wave comes from north. The influence and time of a modern cold wave can not be very long. However, in the geological period, the Permian glacial period is one of the strongest glacial period. According to the information of L. A. Ferres, "many parts of the world were covered by glacier for about 80 ma in late Palaeozoic, which is far longer than that in early Palaeozoic." If it is true, then the period of cold wave in Sakmarian glacial period was not only 8 ~ 10 years, ie, the ice and snow period maybe very long. It is self – evident that the influence of it on the environment can be imagined. Under such a long period of so cold climatic condition, the ice mountain and ice cover can be formed because of the influence of the special strong cold wave. However, the scale of it may be far inferior to that of the ice origin area.

6. As to the palaeogeographic position in Phanerobiolic of Gondwana continent, which has very close relationship with the plate and massif in this area, different scholars have different viewpoints. In "the Palaeolatitude Change of Australia in Phanerobiotic", Embleon (1973) thought that the late Proterozoic glacial activity was past from Cambrian. However, Australia is still located in the high latitude area of the North Hemisphere. A 50° polar migration or plate movement took place in middle Cambrian. Australia moved southwards to the middle latitude area, still in the North Hemisphere, which is not contrary to many geological research results of mid-

dle and upper Cambrian. In Ordovician, it still moved southwards. In early – middle Ordovician, it was in the tropic area, which is very consistent with the geological characteristics used for the climate indices. In Silurian and Devonian, Australia floated successively southwards, the most part of this continent was still located in the South Hemisphere, however, Australia became a continent of the South Hemisphere then. From Cambrian to Devonian, Australia floated latitude about 80°and floated 55°again before the Carboniferous ending. At last, it reached the Antarctic region owing to this successive floatation. The late Palaeozoic glacial activity of this area reached its summit in early Permian. However, there is nearly not any difference between the palaeolatitudes of Permian and late Carboniferous. Till Mesozoic, the palaeomagnetic information shows that the Antarctic basically did not change for Australia, which was located in the high latitude area in that period (Fig 2 – 13).

The situation mentioned above shows Gondwana was located in the high latitude area of North Hemisphere in early Cambrian, continuously floated southwards, and reached the Antarctic region in the phase of Carboniferous. If Baoshan massif is put into the marginal Gondwana, then it began the counterclockwise northward detachment and migration in the late Artinskian of early Permian.

Actually, the study and viewpoint of the palaeogeographic position of Australia oldland by Embleon (1973) are basically consistent with those of this work and YIN Hong – fu, et al (1988) (Fig 2 – 2 ~ 2 – 8) and they are also consistent with our conodont distribution law in various plate and massif in these periods.

Finally, we express our very sincere and heartfelt thanks to many Chinese and abroad colleagues, experts and professors for their many helps and sending many precious, valuable information in our nearly 30 years′conodont study working and writing this book. The main abroad friends to whom we express thanks are as follows: A. C. Lenz, A. D. Mccracken, Alan S. Horowitz, Andrew Swift, Anita G. Harris, A. W. Potter, Carl B. Rexroad, Charles A. Sandberg, Claus – Dieter Clausen, C. R. Barnes, David Williams, Donald L. Eggert, George E. Gehrels, Godfrey S. Nowlan, Hilary A. Plint, H. R. Lane, Jamie L. Butler, J. L. Garcia Alcalde, J. Stephen Huebner, John Beard, Julie A. Dumoulin, Klaus Leuteritz, Lennart Jeppsson, Lewis M. Brown, Michael House, M. G. Bassett, M. Julivert, Nomnan M. Savage, Pnnlleter H. Von Bitter, Robert B. Blodgett, Robert S. Nicoll, Rodney D. Norby, Roland Dreesen, S. Garcia – Lopez, Vivian A. Bejebian, Willi Ziegler, W. John Varker, and Wyatt G. Gilbert.

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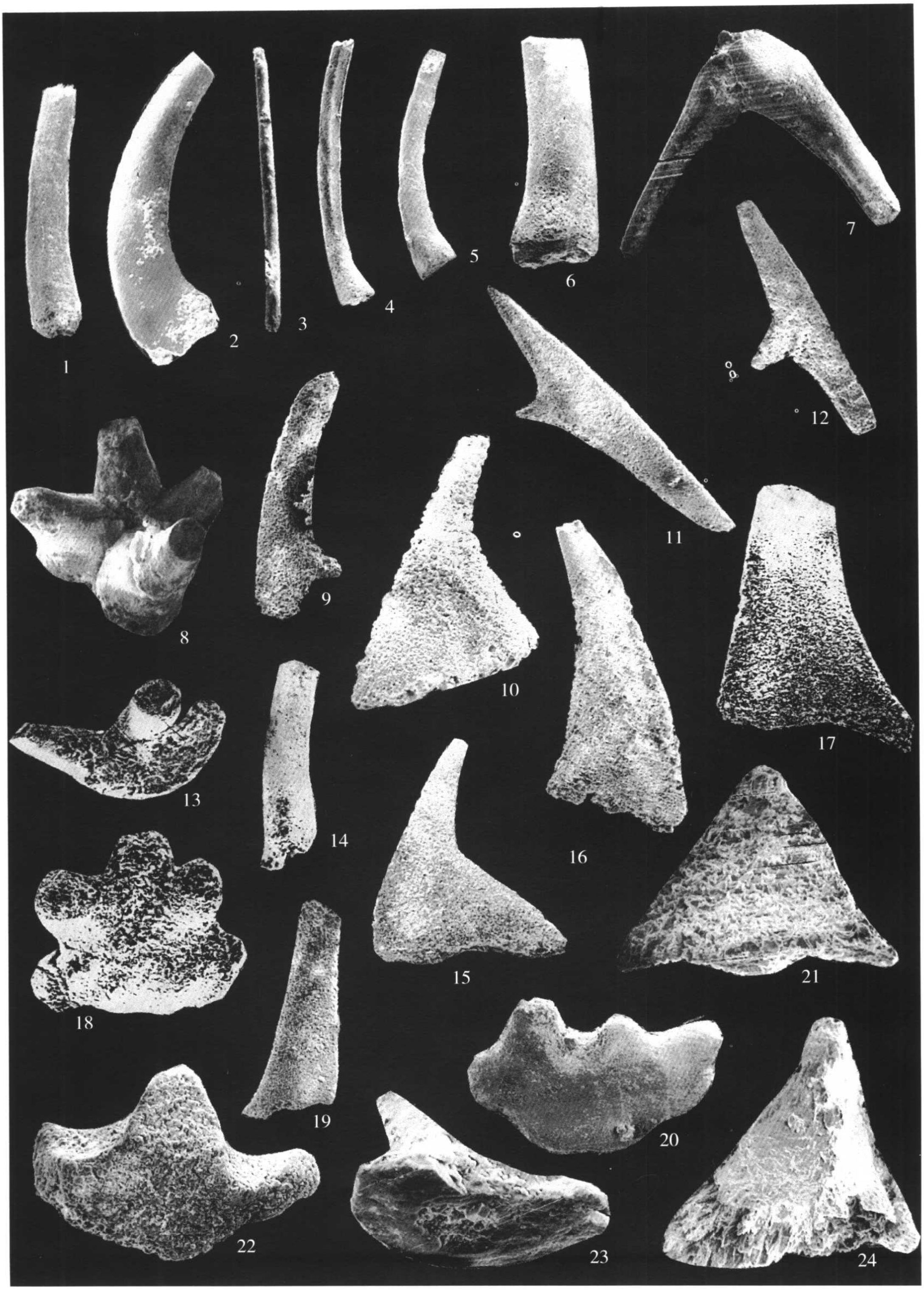
* some conodonts described in the chapter of the division and correlation of conodont zone (series) have not been put into the plates. The reasons are as follows. a. The conodonts in the

appendent plates of this book are mainly the zonation conodonts (zone members), some important index fossils and other very significant composite type conodonts; b. A few zone fossils not included in the plates are originated from some section information of conodont study by other units in Yunnan, which have been substantiated in this book; c. In our original plan, the number of appendent plate is 100. Because of the finance limitation of the project, some conodonts have not been photoset.

Some conodonts not included in the plates mentioned above will be put into the future "The Atlas of Cambrian – Triassic Conodonts in Yunnan".

WANG Wei: the second author, a college graduate, the geological engineer of micropaleontology undertaking the identification of micropalaeotological testing for nearly ten years with the task of identifying and studying the conodonts collected from 1:50000 and 1:250000 regional geological surveying work in Yunnan province and the areas nearby.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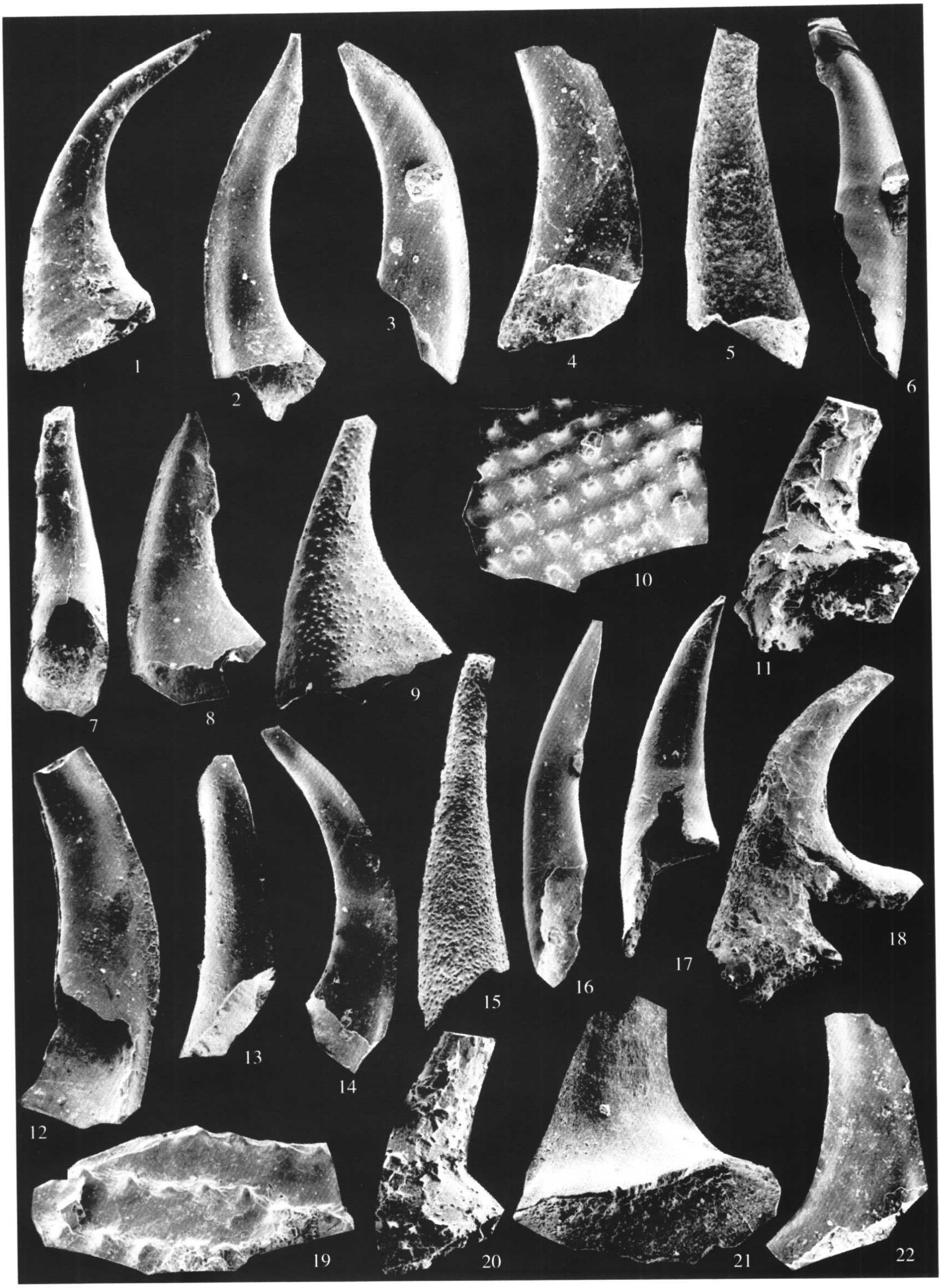
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