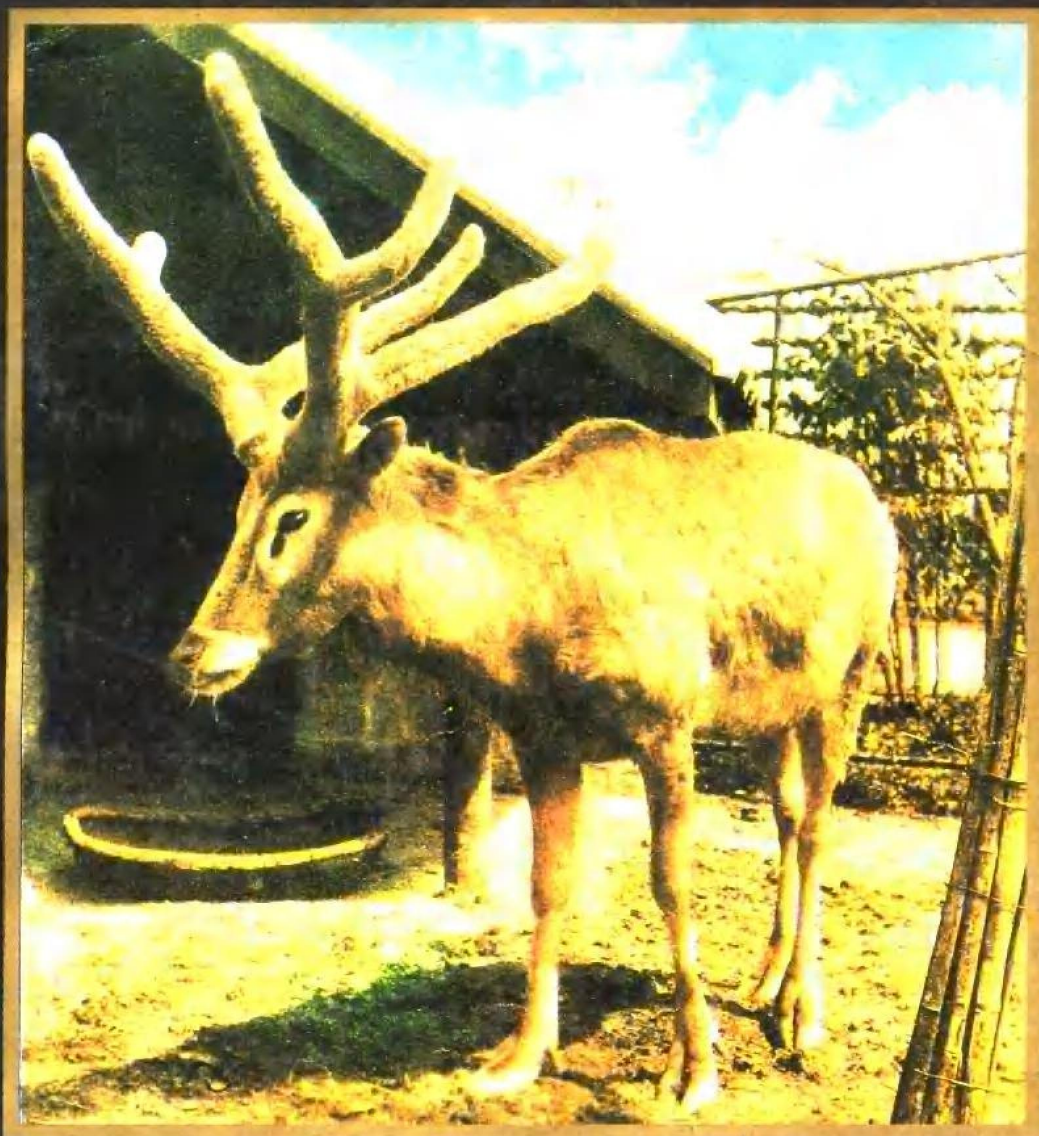


曹克清 邱莲卿 陈彬 缪柏茂编著

# 中国麋鹿

ZHONGGUO MILU



学林出版社

9.83

责任编辑：林耀琛  
封面设计：甘晓培  
版式设计：应黎声

中国麋鹿

曹克清 邱莲卿 编著  
陈 彬 缪柏茂

---

学林出版社出版 上海市文庙路 120 号  
昆崙书店上海发行所发行 丹阳新华印刷厂印刷

开本 787×1092 1/16 印张 13 插页 10 字数 317,000

1990 年 12 月第 1 版 1990 年 12 月第 1 次印刷 印数 1— 400 册

---

ISBN 7-80510-135-3/Q·1 定价(软精装) 9.80 元

---

**On the Mi-deer** (*Elaphurus davidianus*)  
**in China**

---

Written and Compiled by  
Cao Keqing Qiu Lianqing Chen Bin Miao Bomao  
(Shanghai Museum of Natural History)

Xue-Lin Publishing House  
1988

---

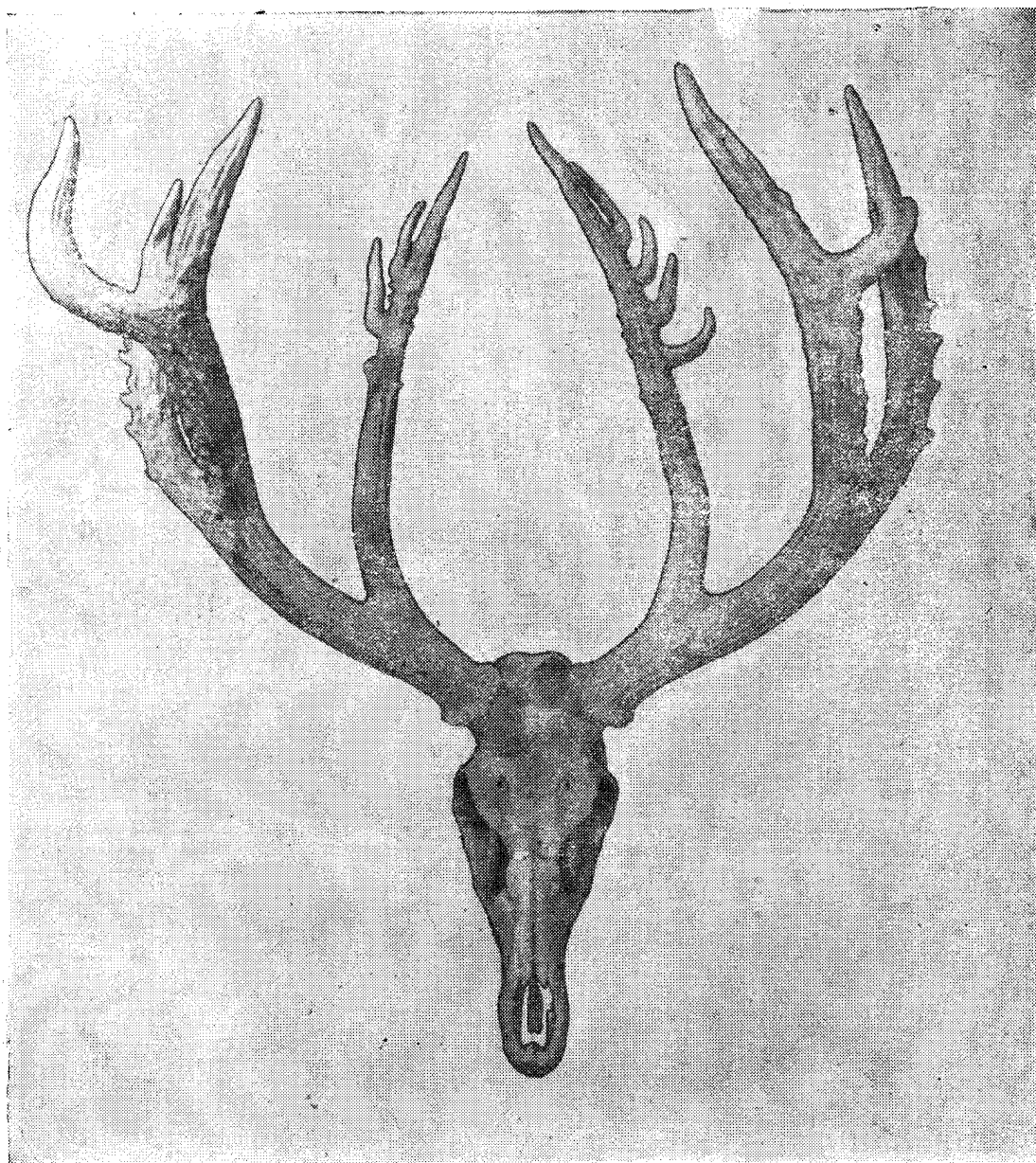


野生麋鹿生活复原景观 麋鹿 (Elaphurus davidianus) 梅花鹿 (Cervus nippon) 水牛 (Bubalus sp.)

- 1. 麋鹿 (*Elaphurus davidianus*);
- 2. 麂 (*Hydropotes inermis*);
- 3. 麝 (*Moschus moschiferus*);
- 4. 梅花鹿 (*Cervus nippon*);
- 5. 水牛 (*Bubalus sp.*);
- 6. 野猪 (*Sus scrofa*);
- 7. 马来貘 (*Tapirus indicus*);
- 8. 犀牛 (*Rhinoceros sp.*);
- 9. 亚洲象 (*Elephas maximus*);
- 10. 猕猴 (*Macaca sp.*);
- 11. 扬子鳄 (*Alligator sinensis*);
- 12. 蛙 (*Rana sp.*);
- 13. 白鹭 (*Egretta sp.*);

中国科学院图书馆

1953.12

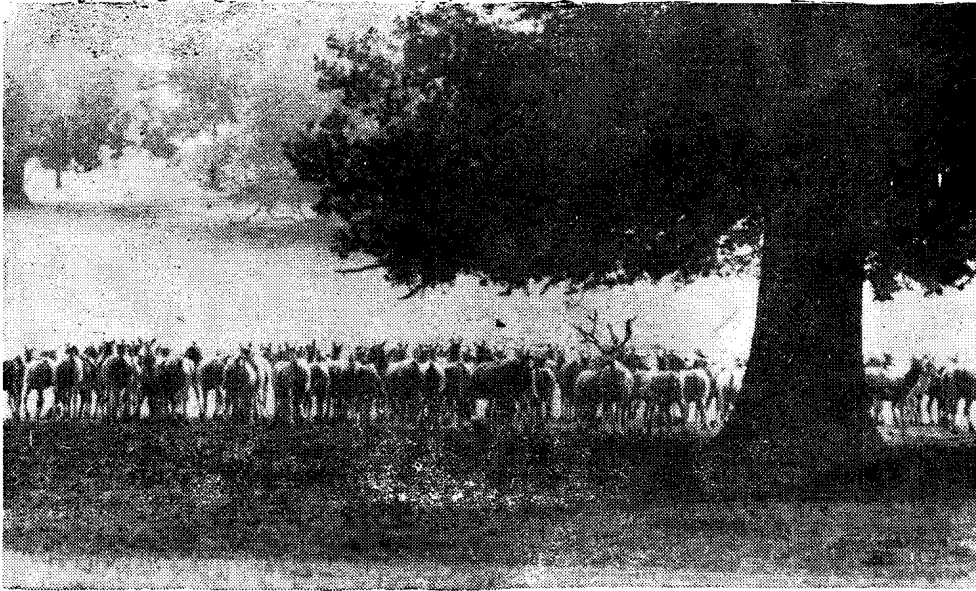


麋鹿(*Elaphurus davidianus* Milne-Edwards),头颅骨和近于完整的角枝(Y、V、2),前视顶视,×1/10  
(此图版承吴炜、宗志新同志摄制)

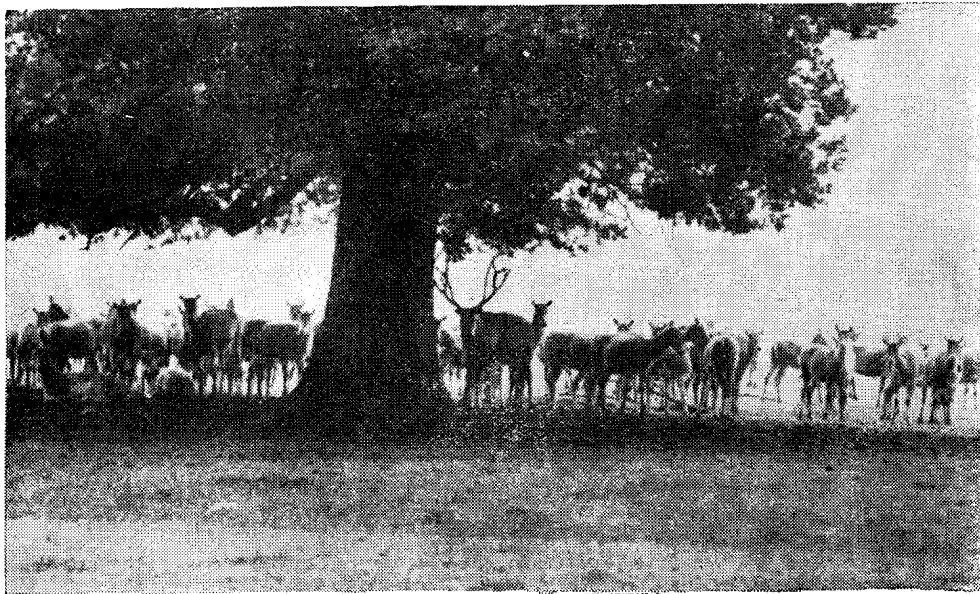
Inside front cover

Mi-deer (*Elaphurus davidianus* Milne-Edwards), fossil skull with a pair of relatively intact antlers (Y.V, 2), front and top view, × 1/10.

(Photograph and plate by Mr. Wu Wei and Mr. Zhong Zhixin)



1



2

英国乌邦寺的麋鹿(*Elaphurus davidianus* Milne-Edwards)群。

图 1. 1982 年发情阶段麋鹿群的一部分

图 2. 在麋鹿的发情区的一棵树下

(照片承英国牛津大学玛娅·博依德女士拍摄)

Inside back cover

Herds of Mi-deer (*Elaphurus davidianus* Milne-Edwards) in Woburn Abbey, England

Fig. 1. One part of the herd of Mi-deer during the rut, 1982.

Fig. 2. Under the tree in the rutting area.

(Photographs by Ms. Maja Boyd in the Dept. of Zoology, Oxford University, England).

## 前 言

---

麋鹿属于鹿科(Cervidae),是一种由中国传到外国,在中国失传半个世纪,现在又回到中国的园囿动物。对它的研究和介绍,不但具有科学意义,而且可以激发我们的爱国之心、乡土之情,可以激发我们挽救濒危物种、保护自然环境的愿望和热忱。

1983年美国人出了一部麋鹿专著“绝灭种麋鹿的生物学和管理”(Beck, B. B. and Wemmer, C. M.: *The Biology and Management of an Extinct Species: Pere David's deer*, pp. 1~193),可谓当今麋鹿生物学和管理学的集大成者,可是其中没有包括野生麋鹿的地史、历史、生态学和古生态学等方面新的和重要的资料。而我们的这部书则以这些方面为重点。因而,也许这两部专著能够相互补充、相得益彰。

我们和我们的同事着手麋鹿的研究工作,当追溯到七十年代初期。七十年代中期后,在学报级的刊物上或国际的学术会议上就不断有论述发表。目前全国已报道的化石和化石产地多半是由我们发表的。在生态学和古生态学方面,特别是对麋鹿之乡——古海陵地区的现代和古代植被,我们也作了较全面和系统的研究。关于麋鹿是东洋区的分子,野生者引进的最佳地区是在长江的下游的新命题,正是在上述工作的基础上提出的。

我们认为现在已具备全面著述,向读者介绍这些新旧资料的条件了。这部书,就是从这个目的出发的。它除了比已有的著作又增加了不少新的成果以外,还系统地整理了我们自己的以及前人所研究发表的有关零散资料,以冀为今后更深入的研究打下一个初步的基础。

我们曾被中国林业部邀请,作为中国方面的科学代表,参加了1984年6月在中国东部一些地区选择野放地点的中外联合考察。我们的研究结论改变了中外学术界关于麋鹿是北方兽类的传统认识,并很快地为世界野生动物基金会(World Wildlife Fund)、国际自然与自然保护同盟(International Union for Conservation of Nature and Natural Resources)、濒危物种人民基金会(People's Trust for Endangered Species)和牛津大学(Oxford University)的代表,诸如:荣求斯博士(Dr. Jungius, H.)、劳顿博士(Dr. Loudon, A.)和博伊德女士(Ms. Boyd, M.)等所接受,也为1984年7月中旬在伦敦举行的国际麋鹿研究会议接受,统一了中外学术界的思想。不几天,伦敦《每日电讯》7月21日和瑞士《世界野生动物基金会新闻》7~8月号等,都以不同方式著文同意并运用了我们提出的长江下游是最后野生麋鹿生活最佳区,也是今天我们重新引进的最适地的论点。

我们无限欣慰的是:我们研究得出结论和中国麋鹿大批引进几乎完全同步。由中国环保

部主持,由英国牛津大学博伊德女士经手,由乌邦寺的主人泰维斯脱克侯爵提供的 22 头麋鹿,1985 年 8 月 24 日运到中国;除 2 头送给上海人民的被饲养在上海动物园外,其余 20 头放回前清最后失去麋鹿群的北京皇家猎苑原址。另一批 39 头,则由中国林业部主持,由荣求斯和路登博士经手,由世界野生动物基金会和国际自然与自然保护同盟提供,1986 年 8 月 13 日运到中国,放回长江下游野生麋鹿最主要的原栖息地古海陵县境现江苏省大丰县境,建立了自然保护区。对于这两批麋鹿的重新引进,我们都曾作出了不同程度的贡献。

在编著过程中,我们始终感到某些不足,特别是  $C^{14}$  断代测定还做得很不够,论述上定性多于定量。再由于作者水平所限和时间仓促,因此,书中会存在一些缺点和错误,恳望读者惠予批评指正。但是,我们相信,它至少能起到抛砖引玉的作用,对深入研讨问题,特别是对这一珍贵动物种群在原产地的复壮繁荣,将会带来一定的益处。

本书写成,不仅仅是我们四位署名作者的劳动,它离不开许多本单位和外单位的同志们的支持。首先是我们的上级——上海市科委的支持以及本馆有关部门的支持。孢粉化石样品承蒙同济大学王开发、张玉兰,上海海洋地质调查局李增瑞、徐金荣、胡仲衡同志的鉴定分析;甲骨文承蒙上海博物馆马承源、白茅左同志鉴定和讲解;陈彬同志负责的第 2 章的一些部分以及第 8~11 章(由于国内缺乏资料,这些章节主要译编参考文献<sup>[118]</sup>),承蒙他的同组组员孙岳平、周小华同志承担部分编译工作;外文承蒙复旦大学外文系查国琛同志审校;图版承蒙本馆摄影室宗志新同志摄制;插图承蒙本馆动物学分馆徐建亚同志绘制;外事工作承蒙本馆外事干部孙向华同志操劳;……。本书的全体作者对于上面提到的同志,或未提到但也帮我们做过工作的同志们,致以由衷的深切的谢忱。

编著者

1986 年 10 月于上海自然博物馆



## Preface

---

Mi-deer is a member of the deer family. It was once exported from China to foreign countries and then extinct in China for half a century, but now introduced back to China. The research and introduction of this animal are not only of scientific significance but also can stir our love for the country or native land, our hope and enthusiasm to save the endangered species and to conserve natural environment.

In 1983, two Americans wrote a book about Mi-deer (Beck, B. B. and Wemmer, C. M.: *The Biology and Management of an Extinct Species: Pere David's deer*, pp. 1~193), which is the most detailed and authentic book of Mi-deer's biology and management. But the book does not include some latest and important materials about Mi-deer's geographical history, history, ecology, palaeo-ecology, etc. Our book lays stress on these subjects. So maybe these two books will supplement and improve each other.

Our setting on the research on Mi-deer can trace back to the early 1970'. From the middle 1970' our research papers have been continually published in the professional journals and issued at international professional meetings. Till now most of the reports on Mi-deer's fossils and fossil localities in our country have been made by us. We have studied systematically ecology and palaeo-ecology, especially modern and ancient vegetation in Mi-deer's original living localities—ancient Hailing County. The new point of view that Mi-deer is an element of Oriental Realm and the most favorable area of introducing Mi-deer in wild is in the lower Yangtze River were put forward based just on the work mentioned above.

We think that conditions now are good enough for us to write a book to give a full introduction to these materials. This is the purpose of this book. Except for a large scale of the latest fruits which the book include, we have arranged systematically piecemeal materials published by ourselves and other predecessors in order to lay a primary foundation for tomorrow's further researches.

In June, 1984, we were invited by Chinese Forest Ministry as the scientist

representatives on Chinese side to take part in the united expedition composed of Chinese and foreign scientists to choose the locality of introducing Mi-deer in wild in the east part of China. Our research conclusions have changed the traditional views of Chinese and foreign scholars that Mi-deer is an animal living in the north and were accepted rapidly by the representatives of the World Wildlife Fund, International Union for Conservation of Nature and Natural Resources, People's Trust for Endangered Species and Oxford University, such as Dr. Jungius, H., Dr. Loudon, A., Ms. Boyd, M. In the mid July, 1984, the International Mi-deer Research Meeting held in London also accepted our view. Thus the thoughts both of Chinese and foreign scientists came into one. Several days later, London's "Daily Telegraph" on 21 July and Switzerland's "WWF News" in Nos. 7~8 and so on all published papers in different styles, accepting and applying our view that the lower Yangtze River area is the most favourable area of the latest wild Mi-deer and also the most favourable area of reintroduction.

What is to our great consolation is that the reintroduction of Mi-deer to China on large scale started nearly at the same time when we reached our conclusions. A herd of 22 Mi-deer, presided by Chinese Environment Ministry, introduced by Ms. Boyd, M., provided by Lord Marques of Tavistock, owner of Woburn, were transported into China on August 24, 1985; 2 heads were given to Shanghai and her people, raised in Shanghai Zoo and the rest were sent back to the original Imperial Hunting Park, Beijing, the last place the Mi-deer came to be lost in Qing Dynasty. Another herd of 39 heads, presided by Chinese Forest Ministry, handled by Dr. Jungius, H. and Dr. Loudon, A., provided by world Wildlife Fund and International Union for Conservation of Nature and Natural Resources, were transported into China on August 13, 1986 and introduced to Dafeng County, Jiangsu province, a part of ancient Hailing County, which is the most important original area of wild Mi-deer in Lower Yangtze River, to establish a natural conservation area. To both of these two heads of Mi-deer's reintroduction, we have contributed our efforts to some extent.

In compiling this book, we feel that there are some shortcomings, especially the work of C<sup>14</sup> dating is not done well enough and the work of quality is done more than that of quantity. Still, because of our knowledge being not enough and time being limited, there exist some shortcomings and error. So, any criticisms and suggestions are welcome. However, we believe that the book will play the role of "throwing stones and bringing back jade" and be good to going into the subjects more deeply, especially about this rare animal's reviving and flourishing in the original habitat.

The fulfilment of the book is the result not only of our work, four authors, but also that of our colleagues in and outside of our museum. First, we were supported

greatly by our superior leader, Shanghai Science and Technique Committee and some concerned departments in our museum. The samples of fossil pollen-spores are analyzed by Professor Wang Kaifa and Zhang Yulan, Tongji University and Miss Li Zhenrui, Mr. Xu Jingrong and Hu Zhongheng, Shanghai Sea Geological Investigation Bureau; The ancient writing inscriptions on the fossil Mi-deer's antler are identified and explained by Mr. Ma Chenyuan and Mr. Bai Maozhuo, Shanghai Museum. Sections 1~2 of Chapter 2 and Chapters 8~11 under the charge of Mr. Chen Bin were partly compiled and translated by his colleagues, Mr. Sun Yueping and Zhou Xiaohua. Its foreign language is revised by Mr. Zha Guoshen, Foreign Language and Literature Department, Fudan University; the plates are taken and made by Mr. Zhong Zhixin, photographic studio of our museum; the foreign affairs are arranged by Miss Sun Xianhua, a secretary of foreign affairs in our museum. We are indebted to these people mentioned above and also to those people who have not mentioned above but have helped us.

Authors

Shanghai Museum of Natural History

October, 1986

# 目 录

---

第一章 绪论	曹克清	( 1 )
第一节 传奇式的身世		( 1 )
第二节 名称问题		( 2 )
第三节 研究简史		( 4 )
第二章 形态特征和标本记述	曹克清、陈 彬	( 6 )
第一节 形态特征	曹克清、陈 彬	( 6 )
第二节 其它特征	曹克清	( 7 )
第三节 关于骨骼化石的研究	曹克清	( 8 )
第四节 关于角枝的研究	曹克清	( 15 )
第五节 关于分类上的一些问题	曹克清	( 19 )
一、现存亚种是否存在的问题		( 19 )
二、种的问题		( 20 )
三、亚属的问题		( 20 )
第六节 德帕锐-裴文中定律	曹克清	( 21 )
第三章 地理分布	曹克清	( 24 )
第一节 以化石资料为依据的地理分布记录		( 24 )
一、日本的麋鹿属化石		( 24 )
二、中国的麋鹿属化石		( 26 )
第二节 以文字资料为依据的地理分布记录		( 33 )
第三节 近代野生麋鹿的记录		( 33 )
一、江苏泰县		( 33 )
二、上海附近		( 33 )
三、海南岛		( 33 )
第四节 现代世界麋鹿放养或饲养的情况以及各个国家具体的数字		( 35 )
第五节 澄清河南安阳殷墟的一例刻有甲骨文的麋鹿角枝化石标本		( 48 )
第四章 关于野生麋鹿古生态学的研究	曹克清	( 49 )
第一节 地质条件		( 50 )

第二节 古气候	(50)
一、气温	(50)
二、湿度	(51)
第三节 古地理	(52)
一、东部平原的总的情况	(52)
二、野生麋鹿分布最集中的地区——长江下游的某些情况	(52)
第四节 共生脊椎动物化石	(57)
一、从全国整体看	(57)
二、从同一层位的具体化石名单逐一分析	(58)
第五节 从现生园饲麋鹿而推知	(64)
第六节 从有史以来人工饲养比较成功的地点的环境推知	(64)
一、南海子	(64)
二、乌邦寺	(66)
第七节 从动物的身体结构推测	(66)
一、蹄	(66)
二、牙齿	(68)
三、尾	(68)
四、毛	(69)
第八节 历史记载	(69)
第九节 结语	(70)
第五章 从古今植被分析当年野生麋鹿的生境	邱莲卿、缪柏茂 (71)
第一节 麋鹿化石出土层的孢粉分析	(71)
第二节 当地现代植被概况	(82)
第三节 麋鹿的食物及野生放养的可行性	(89)
第六章 野生者盛衰大势、绝灭时间、地区及其原因	曹克清 (91)
第一节 盛衰大势	(91)
第二节 绝灭的时间	(92)
第三节 绝灭的地区	(93)
第四节 绝灭的原因	(93)
第五节 对保护现存珍稀动物、保护环境的借鉴意义	(98)
第七章 进化线索以及属源和种源追溯	曹克清 (100)
第一节 进化线索	(100)
第二节 属源和种源的追溯	(101)
第八章 饲养栖息地的条件	陈 彬 (102)
第九章 饲养中的营养和喂食	陈 彬 (106)
第十章 饲养中麋鹿的行为	陈 彬 (111)
第十一章 饲养中种群的生态和管理	陈 彬 (124)
第一节 鉴别技术	(124)
第二节 种内关系	(126)
第三节 群体统计和管理	(131)

第十二章 经济价值和学术价值.....	曹克清 (133)
第十三章 关于野生麋鹿回归中国具体放养地点的选择问题.....	曹克清 (135)
主要参考文献.....	(144)
图版及其说明.....	(151)
英文摘要.....	(183)

## Contents

---

<b>Chapter I. Introduction.....</b>	Cao Keqing ( 1 )
Section A. Poetic dramas of Mi-deer.....	( 1 )
Section B. Problems of the names about Mi-deer.....	( 2 )
Section C. A brief research history of Mi-deer.....	( 4 )
<b>Chapter II. Mi-deer's biological characteristics and specimen descriptions</b>	
.....	Cao Keqing and Chen Bin ( 6 )
Section A. Mi-deer's morphological characteristics... Cao Keqing and Chen Bin	( 6 )
Section B. Mi-deer's other characteristics.....	Cao Keqing ( 7 )
Section C. Notes on osteology of Mi-deer's fossils.....	Cao Keqing ( 8 )
Section D. Notes on osteology of Mi-deer's antlers.....	Cao Keqing ( 15 )
Section E. Some problems of Mi-deer's systematics.....	Cao Keqing ( 19 )
1. Problems of the sub-species about Mi-deer.....	( 19 )
2. Problems of the species about Mi-deer.....	( 20 )
3. Problems of the sub-genus about Mi-deer.....	( 20 )
Section F. Deperet — Pei's Law.....	Cao Keqing ( 21 )
<b>Chapter III. Geographical distribution of Mi-deer.....</b>	Cao Keqing ( 24 )
Section A. Records of geographical distribution on the basis of fossils.....	( 24 )
1. Genus <i>Elaphurus</i> fossils in Japan and Soviet Union.....	( 24 )
2. Genus <i>Elaphurus</i> fossils in China.....	( 26 )
Section B. Records of geographical distribution on the basis of historical	
data about Mi-deer.....	( 33 )
Section C. Records of the wild Mi-deer in modern times.....	( 33 )
1. In Taixian, Jiangsu.....	( 33 )
2. In Shanghai or nearby.....	( 33 )
3. In Hainan, Guangdong.....	( 33 )
Section D. Major distribution of domestic or semi-domestic living Mi-deer	
in the world today.....	( 35 )
Section E. Fake inscriptions of ancient writing on the fossil Mi-deer's	
antler from Anyang, Henan.....	( 48 )

<b>Chapter IV. Researches on paleo-ecology of the wild Mi-deer</b> .....	Cao Keqing ( 49 )
Section A. Geological conditions .....	( 50 )
Section B. Ancient climate .....	( 50 )
1. Temperature .....	( 50 )
2. Humidity .....	( 51 )
Section C. Paleo-geography .....	( 52 )
1. General situations of the plains in the eastern part of China.....	( 52 )
2. Situations of wild Mi-deer's widest distribution over the delta plain of the Yangtze River.....	( 52 )
Section D. Mi-deer's fossil and its vertebrate fossil groups .....	( 57 )
1. General analysis of the nation-wide fossils .....	( 57 )
2. Separated analysis of the fossils in the same layer and period .....	( 58 )
Section E. Judgement from the domestic or semi-domestic living Mi-deer in the world .....	( 64 )
Section F. Judgement from the surroundings in Woburn Abbey and in Nanhaizi .....	( 64 )
1. In Nanhaizi .....	( 64 )
2. In Woburn Abbey .....	( 66 )
Section G. Judgement from the morphological characteristics of Mi-deer itself ...	( 66 )
1. Hooves .....	( 66 )
2. Teeth.....	( 68 )
3. Tail .....	( 68 )
4. Hair .....	( 69 )
Section H. Some historical data on Mi-deer .....	( 69 )
Section I. Conclusions .....	( 70 )
<b>Chapter V. Analysis on wild Mi-deer's habitat on the basis of ancient and modern vegetations</b> .....	Qiu Lianqing and Miao Bomao ( 71 )
Section A. Analysis on the spore-pollen of the fossil strata .....	( 71 )
Section B. A survey of the local present vegetation .....	( 82 )
Section C. Mi-deer's food and feasibility of reintroducing Mi-deer into wild ...	( 89 )
<b>Chapter VI. The gradual increase and decline of the Mi-deer during the Quaternary Period: the time, locality and causes of the extinction of the wild Mi-deer in China</b> .....	Cao Keqing ( 91 )
Section A. Mi-deer's gradual increase and decline.....	( 91 )
Section B. Time of Mi-deer's extinction .....	( 92 )
Section C. Locality of Mi-deer's extinction .....	( 93 )
Section D. Causes of Mi-deer's extinction.....	( 93 )
Section E. Importance of protecting rare living creatures and their environment... ( 98 )	
<b>Chapter VII. Hypothesis of Mi-deer's evolution and origin of the species and the genus</b> .....	Cao Keqing ( 100 )



Section A. Hypothesis of Mi-deer's evolution .....	(100)
Section B. Origin of the species and the genus .....	(101)
<b>Chapter VIII. Conditions of Mi-deer's captive habitats.....</b>	<b>Chen Bin (102)</b>
<b>Chapter IX. Mi-deer's feeding and nutrition.....</b>	<b>Chen Bin (106)</b>
<b>Chapter X. Mi-deer's behavior in captivity.....</b>	<b>Chen Bin (111)</b>
<b>Chapter XI. Sociology and management of the species and its population....</b>	<b>Chen Bin (124)</b>
Section A. Techniques of identification .....	(124)
Section B. Relations inside the species .....	(126)
Section C. Demographic management.....	(131)
<b>Chapter XII. Practical value and significance in economy and science ...</b>	<b>Cao Keqing (133)</b>
<b>Chapter XIII. Recommendations for the most suitable re-introduction area of the wild</b>	
<b>Mi-deer to China.....</b>	<b>Cao Keqing (135)</b>
References .....	(144)
Plates and their notes .....	(151)
English abstract.....	(183)

珍