

中国白唇鹿

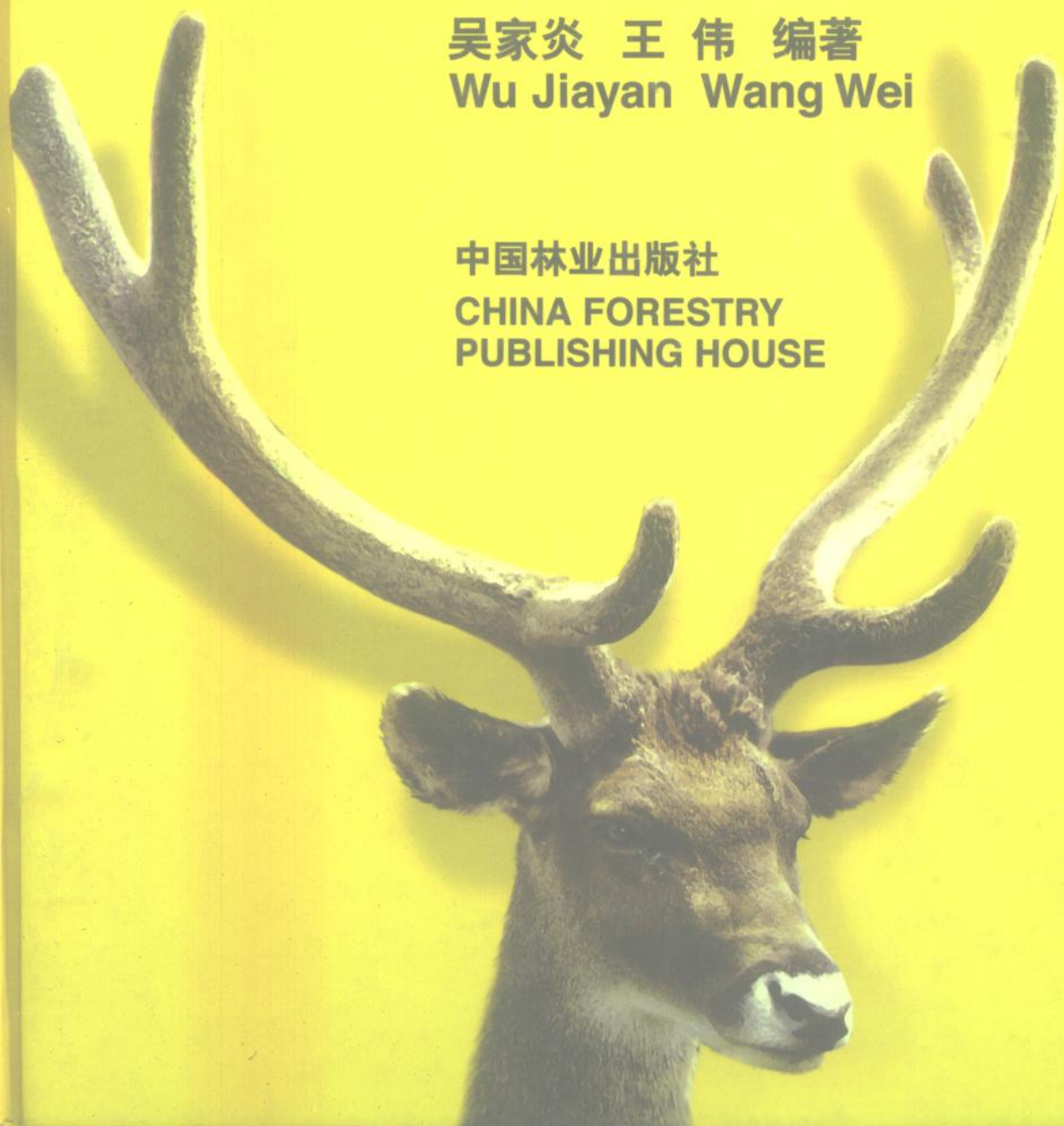
THE WHITE LIPPED-DEER OF CHINA

吴家炎 王伟 编著

Wu Jiayan Wang Wei

中国林业出版社

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前 言

中国是一个鹿类资源极为丰富的国家,从化石鹿类到现生鹿类均为世界上属种最多、最有特色的地区。据统计:包括麋鹿科在内的鹿类共 3 科,4 亚科,23 种,38 个亚种,占世界鹿类种数(48 种)的 45.8%,几乎达全球总数的一半。中国不仅是鹿类的祖先——古麋鹿(*Archaeomeryx optatus*)的化石产地,也是现生麋鹿及鹿类重要属种的集中分布地,如麝科(*Moschidae*)、麝亚科(*Muntiacinae*)、獐亚科(*Hydropotinae*)、鹿亚科中的水鹿(*Cervus unicolor*)、梅花鹿(*Cervus nippon*)、马鹿(*Cervus elaphus*)等大部分种及亚种分布之广是任何国家都无可比拟的。此外,中国的这些鹿类种属有较多的特有属、种及特有亚种,故国际著名的动物学家 Geist(1991)认为:“中国是鹿类动物地理分布及系统进化的主要地区”。在研究世界上鹿类起源进化、分类系统及生态生物学特征时,离开中国这一部分是不可能完成的。

白唇鹿(*Cervus albirostris*)是中国鹿类中的特有种之一,它仅分布于青藏高原,包括青海、西藏、甘肃、四川西部及云南西北部。白唇鹿的化石种及现生种均发现在青藏高原,它是在高原特有的条件下演化而成的。动物分类学家 Groves 和 Grubb (1987)指出:“白唇鹿被认为是黑鹿(*Epirusa wilzheimeri*)的后裔,在进化上是很独特的一支,是水鹿(*Cervus unicolor*)及坡鹿(*Cervus eldi*)的姊妹群”。可见研究白唇鹿的起源进化、生态生物学特征,不仅能了解它在高原得以生存及发展的原因,而且对整个鹿类的分类系统研究也具有相当重要意义。

白唇鹿分布于青藏高原,因而所知者甚少。自 1883 年俄国 Przewalski 在甘肃肃北首次获得标本之后,即记录于《第三次亚洲之行》(Third Journey in Central Asia)一书上。10 年之后,英国人 Blanford (1893)在西藏考察,也在拉萨附近林周县发现白唇鹿,随之被称为“泰勒鹿(Thorold's deer)”;德国人 Engelmann 于 1938~1939 在四川边境考察,又报道了白唇鹿在四川的分布;美国人组织的“中亚调查团”到中国西部调查,由 Allen (1940)将这些调查结果总结于《中国及蒙古的兽类》(The mammals of China and Mongolia)一书内,但这些材料只涉及初期白唇鹿地理分布的一小部分。

从 60 年代初起,中国科学院、原林业部及各省(自治区)政府为摸清资源,曾经组织过几次重大的动物资源普查,各地对自己的动物资源情况有了比较全面的了解。后来由一些专家编写的专著,如胡锦涛等(1984)编著的《四川资源动物志——兽类》、冯祚建等(1986)编著的《西藏哺乳类》、李德浩等(1989)编著的《青海经济动物

志》、王香亭等(1991)编著的《甘肃脊椎动物志》以及尹秉高、刘务林(1993)主编的《西藏珍稀野生动物及保护》等,均作为编著本书的基本资料。虽然上述专著对各地物种已有一个普遍的描述,但将白唇鹿作为一个单一物种的地理分布、数量密度及生态生物学资料,用于保护与管理对策还缺乏深度和广度。

由于对基本资料掌握不准,国际自然保护联盟(IUCN)将白唇鹿列入“不确定型(Uncertain)”,或列入“濒危级(Endangered)”,或列入“易危级(Vulnerable)”及“珍稀级(Rare)”,其最终级别难以确定。

基于此,西北濒危动物研究所在1985年向原林业部申报建立研究课题,以进行长期的、细致的调查研究,求得对白唇鹿有一个较为系统的全面了解。与此同时,日本北海道大学(Hokkaido University)的大泰司纪之(Noriyaki Ohtaishi)先生提出合作调查研究。随后于1986年初由原林业部野生动物和森林植物保护司与日本北海道大学大泰司纪之先生签订合作协议,成立中日联合调查队,完成“白唇鹿生态生物学及保护的调查研究”课题,合作从1986年起到1990年止,为期5年。

5年中,中方参加调查研究的单位及人员有:原林业部野生动物和森林植物保护司卿建华、李玉铭、王伟、范志勇,西北濒危动物研究所吴家炎、郑生武、朱洵美、韩亦平、余玉群、刘楚光、纪明周、姚东臣、陈远、田丰、姜海涛,青海省林业厅袁锡、何玉邦,四川省林业厅胡铁卿、崔阳韬、彭基泰、杨庆红,甘肃省林业厅田安顺,西藏自治区林业厅刘务林、桑杰、卢伟;日方参加调查和研究的单位和人员有:日本北海道大学大泰司纪之(Noriyaki Ohtaishi)、尾光一(Koichi Kaji)、尾田(Seiki Takatsuki)、武田雅哉(Takeda gakana)、施禾(留学生),日本兵庫医科大学三浦慎悟(Shingo Miura),日本农林省林业试验站关西支场小泉透(Tora Koizumi)。

1986~1991年,5年间中日合作调查队曾先后到以下省、地区(县)调查:青海的湟源、玛多、治多、祁连、曲麻莱、囊谦,甘肃的山丹、肃北、肃南及毗邻新疆的阿克赛,四川的甘孜、德格、石渠、白玉;西藏的江达、林周。调查期间选择了4个重点“调查点”进行了比较细致的调查和研究,它们是青海玛多的扎陵湖、甘肃肃北的盐池湾、四川石渠的洛须乡及西藏林周的阿郎乡。调查期间还选择了6个养鹿场作重点考察,它们是青海省西宁市的多巴鹿场、青海省治多县的治多鹿场、青海省祁连县的托莱牧场养鹿场、甘肃省山丹县军马场的养鹿场、甘肃省肃南县的养鹿场及四川省石渠县的鹿场。

调查结束后,共获白唇鹿头骨标本48号,完整标本3号;植物标本800余号,分属120余种。调查期间及其后,中日双方科技人员共撰写论文20余篇,至今不已,本书均予以记叙。

由于白唇鹿分布于青藏高原,它的栖息地多在人烟稀少的高原,一般均在4000 m以上,加之白唇鹿迁移性很大,这也给调查带来了诸多困难。另受交通、食宿、气候等艰苦条件的影响,使研究结果不够完善,不足之处在所难免。编著本书,仅希望对这一特有种有一个较为完整的材料,供管理及保护人员使用,使白唇鹿的保护及管理提高到一个新的高度。也希望以此为鉴,对我国其他特有种、珍稀种的调查研究,取得一些比

较完整的结果。同时，希望我国的动物研究工作者百尺竿头，将我国的鹿类研究工作发展下去，在此基础上，取得更大成就。

5 年来的调查、研究以及编写本书过程中，承中国科学院动物研究所汪松先生、高耀亭先生、冯祚建先生指导及帮助，中国科学院西北高原生物研究所蔡桂全先生、中国科学院发育生物研究所莫鑫泉先生、山东师范大学王晓安先生惠寄论文，修改文稿。在调查研究中还得到各省（自治区）及所到各县同志的协助，本书初稿拟成之后，又承西北农业大学学报编辑部副编审刘佩芬女士在编写规范化标准化及文字加工方面进行修改，最后，在完成书稿中陕西省动物研究所王艳予以协助。没有上述帮助，本书难以完成，特在此一并致谢。

吴家炎

1999 年 3 月

Preface

China is abundant in deer resources. It has the most deer species and genus ranging from fossil to living deer. The statistics shows that it has altogether 3 family 4 subfamilies and 23 species 38 subspecies. That accounts for 45.8% of the world deer resources of 48 species. China is both the place of production of the fossil deer – *Archaeomeryx optatus* – the ancestor of the deer and the main distribution area. Many deer species and subfamilies distribute in China, such as Moschidae, *Muntiacinae*, *Hydropotinae*, *Rusa deer* (*Cervus unicornis*), Sika deer (*Cervus nippon*), Red deer (*Cervus elaphus*) of Cervidae. Besides, these deer distributing in China have many their special genus, species and subspecies. The distinguished zoologist Mr. Geist (1991) said that China is the central place of the geographical distribution and systematic evolution of deer. In studying the deer evolution, systematic classification and bioecology, it can not be achieved fully if without a thorough study in China.

White lipped deer or Thorold's deer is the special species of China and only distribute in Qingzang plateau, including Qinghai province, Tibet, Gansu province, the western area of Sichuan province, and the northwestern area of Yunnan province. Both the living and fossil species of white lipped deer is found in the Qingzang plateau, therefore, it shows that the white lipped deer evolved under the certain condition of the plateau. Mr. Groves and Mr. Grubb (1987) pointed out that the white lipped deer is the offspring of *Epirusa wilzheimeri*. It was the special branch in the evolution. It is the sister group of the rusa deer and eld's deer (*Cervus eldi*). To study the origination, the evolution and the bioecology of the white lipped deer could help us to learn the reason why the white lipped deer could survive and develop in the plateau. Besides, it has the great significance on the study of the classification of the deer resources.

As the white lipped deer distributes in the Qingzang plateau, it is rarely known. Mr. Przewalski of former USSR first got the speciesman in Gansu province in China in 1883. It was recorded in the "Third Journey in Central Asia". Ten years later, Branford F. R. S. from U. K. in 1893 found the white lipped deer in the Linzhou County near the Lasa City. It was named Thorold's deer. During 1938 to 1939, Engelmann from Germany reported

the distribution of the white lipped deer after his investigation in Sichuan province. Allen G. M. of the Centre - Asia Investigating Delegation organized by the USA. took down all these reports in "The Mammals of China and Mongolia" in 1940. However, all these reports on the white lipped deer were only on the initial stage of the study of the geographical distribution.

Since 1949, in order to sounder out the natural resources of China, some animal resources investigation were held by the Chinese Academy of Sciences, the National Bureau of Forestry and the Provincial governments. Some books have become the data of this book though these books only had a general description on the regional animal resources and without a detail study on the white lipped deer. Some reference books are the "Animal Resources of Sichuan Province" (by Hu Jinchu, 1984), "Mammals in Tibet" (by Feng Zuojian, 1986), "Economic Animal Resources in Qinghai Province" (by Li Dehao, 1984), "Vertebral Animals in Gansu Province" (by Wang Xiangting, 1991), and "Wild Animal Resources and Their Protection in Tibet" (by Yin Binggao and Liu Wusheng, 1993).

Being short of the basic data, the white lipped deer is ranked in Uncertained, Endangered, Vulnerable, or Rare Species by the IUCN.

In order to get a detailed data of the white lipped deer, the Northwest Institute of Endangered Zoological Species asked for to set up a study task to have a long - term research from the National Bureau of Forestry. At the same time, Mr. Noryaki Ohtaishi of Hokkaido University asked for a co - research with the Northwest Institute of Endangered Zoological Species. Afterwards, a China - Japanese Research Team was established based on the agreement signed by the Protecting Department of the National Bureau of Forestry and Mr. Noryaki Ohtaishi of Hokkaido University to fulfill the research task. The co - research term lasted from 1986 to 1990. The title of the task was The Bioecology and the Protection of the white lipped deer.

During the five years study, Chinese personnel involved are: Qing Jianhua, Li Yuming, Wang Wei and Fan Zhiyong from the Animal Protection Department of the National Bureau of Forestry; Wu Jiayan, Zheng Shengwu, Zhu Xunmei, Han Yiping, Yu Yuqun, Liu Chuguang, Ji Mingzhou, Yao Dongchen, Chen Yuan, Tian Feng, and Jiang Haitao from the Northwest Institute of Zoological Species; Yuan Xi and He Yubang from the Forestry Department of the Qinghai Province; Hu Tieqing, Cui Yangtao, Peng Jitai and Yang Qinghong from the Forestry Department of the Sichuan Province; Tia Nanshun from the Forestry Department of the Gansu Province; Liu Wulin, Sang Jie, Peng Jitai, and Yang Qinghong from the Forestry Department of the Tibet. Personnel from Japan are: Noriyaki Ohtaishi, Koichi Kaji, Seki Takatsuki, Takeda Gakana (student), Shihe (a Chinese over - sea student) from Hokkaido University; Singo Miura from Hyogo College of Medicine; Tora Loizumi from Kansai Branch, Forest and Forest Products Research Institute.

The China - Japanese Investigating Delegation had studied the following areas since 1986 to the spring of the 1991. They are: Huangyuan County, Maduo County, Zhiduo County, Qilian County, Qumalai County and Nangqian County of Qinghai Province; Shandan County, Subei County, Sunan County and Akasai County of Gansu Province; Ganzi County, Dege County, Shiqu County and Baiyu County of Sichuan Province; Jiangda County and Lingzhou County of Tibet.

During the term, four areas had been chosen to have a detailed study. They are: Zhaling Lake in Maduo County of Qinghai Province; Yanchiwan in Subei County of Gansu Province; Luoxu in Shiqu County of Sichuan Province; Alang in Linzhou County of Tibet.

Besides, six deer farms had been chosen to have a detailed study. They are: Duoba Deer Farm in Xining City, Zhiduo Deer Farm, and Toulai Deer Farm of Qinghai Province; Shandan Deer Farm and Sunan Deer Farm of Gansu Province, and Shiqu Deer Farm of Sichuan Province.

After the study had finished, the team altogether got 48 specimen of the white lipped deer skull, 3 specimen of the white lipped deer, over 800 - flora specimen belong to 120 genus. In addition, over 20 papers had been published.

As the white lipped deer in the Qingzang Plateau, the habit are rarely inhabited. The altitude usually is over 4000 meters. In addition, the white lipped deer is migratory. All these disadvantages cause the imperfect of the study. In conclusion, to some extent, this book is to give a complete data and reference to the managing staff and zoologists. We also hope that other species of rare rank animals could be studied carefully and other contributions could be given to the protection of the rare rank animals.

We are sending our regards to Mr. Wang Song, Mr. Gao Yaoting and Mr. Feng Zhajian from the Institute of Zoology of Academia Sinica in acknowledgement to their valuable help in the five years study. In addition, Mr. Cai Guiquan from the Northwest Institute of Plateau Biology of Academia Sinica, Mr. Mo Xinquan from the Institute of Maturation Biology of Academia Sinica, Mr. Wang Xiaolan from Shandong Normal University, Ms. Wang Yan from Shannxi Institute of Zoology and Ms. Liu Peifen from the Northwest Agricultural University are thanked of their helps in compiling this book.

Wu Jiayan

1999. 3.

摘 要

一、大陆形成的过程是以 Wegener (1912) 提出的“大陆漂移说 (Continental Drift)”为基础。大陆的变化,使气候、生物引起强烈变化。5000 万年前,在第三纪的始新世至渐新世时期,印度板块向北漂移与欧亚板块的亚洲大陆相互挤碰,其北缘插在亚洲板块之下,形成了喜马拉雅山脉。

鹿类是由古麕鹿发展起来的,喜悦古麕鹿 (*Archaeomeryx optatus*) 是唯一产在中国内蒙的古麕鹿化石。发现它的意义在于:鹿类的起源及进化中心可能在中国华北一带,并由此而逐步演化。中国是一个化石鹿类丰富的国家。共 5 科 7 亚科,84 种 (1974 年止)。化石黑鹿 (*Rusa*) 及斑鹿 (*Pseudaxis*) 显然由麕鹿逐步演化发展而来。这两种鹿类曾广泛分布于欧亚大陆。白唇鹿是在青藏高原特殊的地理环境条件下形成的特化种,它的化石仅发现于西藏聂拉木县第三纪上新世时期。

中国也是现生鹿类丰富的国家,共 3 科,4 亚科,23 种,38 亚种,占世界鹿类 (48 种) 的 45.8%,故被称为“鹿类动物地理分布及系统进化的主要地区”。

二、现生白唇鹿分布于青藏高原,包括青海、四川西部、西藏、甘肃及云南西北部。从行政市 (地区)、县的范围看,共分布于 5 省 (自治区)、18 市 (地区、州)、68 县。它们分别是:

西藏自治区的分布在 4 个市 (地区)、18 个县。从生态地理分布看整个位置在雅鲁藏布江以北的冈底斯山—念青唐古拉山—横断山脉之间。从动物地理的角度看,也恰巧在“藏东山地小区”的范围内。

青海省的分布在 6 个地区 (州)、19 个县。实际分布在 4 个“片”上,第一个是祁连山区的门源、祁连的海北分布区;第二个是青藏高原腹地、长江源头唐古拉山脉的玉树、果洛两州的 11 县组成的第二片;第三是海西州东部的乌兰、天峻两县;其四是黄南州的尖扎、海南并与甘肃玛曲相连的单独片。

四川省的分布在 4 个地区 (州)、24 个县。从生态地理分布看,整个位置在沙鲁里山—大雪山—邛崃山之间。

甘肃省的分布在 3 个地区 (州)、6 个县。主要位于祁连山的北坡,向西延伸至新疆边境。

云南省仅分布 1 州 1 县。

整个分布区的经纬跨度意见不尽相同,北纬的起点由 $29^{\circ}\sim 29.5^{\circ}$ 到 $38.7^{\circ}\sim 40^{\circ}$, 东

经由 $92^{\circ}\sim 92.5^{\circ}$ 到 $102^{\circ}\sim 120^{\circ}$ 。

三、分类系统作者仍赞成使用 Simpson 系统。其亚科分类仍保留鹿科 (Cervidae) 下分为麝亚科 (Moschinae)、鹿亚科 (Muntiacinae)、鹿亚科 (Cervinae) 及空齿鹿亚科 (Odocoileinae)。

在形态分类上, 白唇鹿是鹿属 (*Cervus*) 中较独立的一种。王宗仁 (1982) 通过对鹿属几种鹿的染色体组型的研究, 提出了其进化机制是罗伯特断裂的观点。通过对罗伯特断裂的规律和化石材料组型进化特征的比较, 他认为, 泽鹿 (*C. duvauceli*) 及黑鹿 (水鹿) (*C. unicolor*) 是最古老的种类, 其次是白唇鹿 (*C. albirostris*) 和梅花鹿 (*C. nippon*), 最后是马鹿 (*C. elaphus*)。王宗仁等 (1988) 利用血清蛋白 SDS-聚丙烯酰胺凝胶电泳分析蛋白区带变化, 也证明了上述分析是正确的。鹿属亲缘关系的远近是黑鹿 (水鹿)—白唇鹿—马鹿—梅花鹿。王蕴玲等 (1996) 用聚丙烯酰胺凝胶电泳分析同工酶, 认为梅花鹿及马鹿亲缘关系最近, 白唇鹿和前者关系稍远。上述分析和形态分类的研究结果一致。

形态、染色体组型、蛋白区带变化及同工酶研究并结合化石的产生年代及特征, 都证明白唇鹿是从黑鹿分化而来, 为较古老的一支。

四、生活在中国青藏高原的白唇鹿是典型的高寒动物。其分布区域内气候寒冷而又十分干旱, 年降水量 200~700 mm, 平均气温 $-20\sim 0^{\circ}\text{C}$ 。林界约海拔 3500~4000 m, 上部为高山草甸。白唇鹿栖息环境主要有以下几个类型: 高寒高原荒漠 (4300 m 以上)、高寒草甸草原 (3700~4300 m)、高寒灌丛 (3600~3900 m)、高山森林草原 (3500~4000 m)。

白唇鹿采食植物种类达 95 种, 分别隶属 25 科。其中最喜食植物 35 种, 喜食植物 30 种, 分别占食物种类的 37% 和 32%。禾本科和莎草科植物所占比重较大。在草本植物缺乏时亦进食部分灌木植物的嫩枝叶、牙苞等。

白唇鹿的日活动规律通常表现为食草循环周期, 每日有两个进食高峰, 即清晨和傍晚。通常, 白唇鹿营集群生活方式, 其集群大小随季节的不同和栖息环境的改变而有变化。白唇鹿的集群形式依群体大小和组成, 可划分为以下 3 个主要类型: 非繁殖季节的雄性群 (仅由雄鹿组成) 和雌性群 (包括雌鹿、幼鹿和 3 岁以下的小公鹿) 以及发情交配期的混合群。这 3 种集群形式中雄性群最小, 雌性群次之, 混合群最大, 最多可达 360 多只 (蔡桂全, 1992)。白唇鹿发情交配期的交配群为 1 雄多雌制。

据青海省和四川省鹿场的资料, 白唇鹿在人工饲养和半放养状态下, 雌鹿 2 岁左右开始繁殖, 雄鹿 3 岁左右表现出性行为, 5 岁或更大时可参与交配繁殖, 7 岁雄鹿表现出活跃的发情期行为。白唇鹿发情始于雄性鹿茸脱落的 9 月。受分布地区不同和海拔高度的影响, 其始发情时间和持续时间有所不同, 约在 9~11 月间。其中最早发情报道见于 8 月 20 日 (余玉群, 1995), 最晚结束交配报道为 12 月 17 日 (蔡桂全, 1992)。于翌年 5~6 月产仔, 孕期 8 个月, 约 230~250 天。刚降生的白唇鹿幼仔体重约 8.6 kg。野外白唇鹿种群每 100 只雌鹿产仔 16~80 只, 平均 36 只。

在青藏高原白唇鹿分布区内, 除白唇鹿外, 其他有蹄类动物约有 9 种。这些有蹄类

动物经常栖息于白唇鹿相似的生境。不同种类在选择生境上稍有差别。牦牛和盘羊通常选择山坡地带，藏羚和藏原羚生活在较平坦地带，而野驴则在这两种生境中均可见到。

五、白唇鹿的社群行为。国内外学者做了大量的研究工作，并对白唇鹿的各种行为类型进行了详细报道。白唇鹿的诸多行为类型可划归为3个主要类群，即发情期行为、哺乳（抚仔）行为和防御行为。

发情期行为：随着白唇鹿发情期的到来及雄性鹿群的解体，雄鹿进入雌鹿群控制雌鹿形成交配群。此时的雄鹿通过自我显示发出叫声以建立自己的优势地位。标记行为主要包括蹭、撞角、踢卧等，这些行为在鹿科动物中均较常见。雄鹿间彼此争斗时通常伴随有泥浴行为或单独展示泥浴行为，这些标记行为均与嗅觉相关，亦可称之为间接进攻行为。发情季节的雄鹿会发出咆哮和嚎叫两种不同的叫声，咆哮声响亮，持续时间4.5~6秒，为远距离的自我宣扬行为；相反，嚎叫声持续时间仅2.4秒，为近距离的间接进攻方式。雄性白唇鹿的优势地位是通过种内竞争建立起来的。优势雄鹿通常为IV年龄组个体。它们通常对其他雄鹿展示攻击行为，如低头恐吓、冲击、格斗等。白唇鹿的一系列求偶行为如卷唇、嗅闻、尾随、配对、咳压、爬跨等，与鹿科其他动物基本相似。

哺乳（抚仔）行为：除个别情况，白唇鹿在哺乳时，雌鹿和幼鹿均发出似猫叫一样的微弱叫声。雌鹿的这种哺乳声持续时间约0.48秒，频率为0.4~2.2 kHz。幼鹿的这种叫声持续时间为0.52秒，频率为0.2~3.2 kHz，这种叫声是幼鹿与雌鹿相互接近或寻找时发出的。

防御行为：白唇鹿雄性个体在相互攻击对方时，常可见到它们用前蹄踢对方或撕咬对方，这些行为表现为对对方攻击的同时亦显其自我防御行为。另外，白唇鹿在遇到敌害时，亦可通过游水渡过河湖以达到逃避敌害的目的。

六、白唇鹿的外部形态特征主要表现在被毛及头骨结构上。白唇鹿既无绒毛层又无脂肪层，它的针毛毛径特别粗，针毛的髓质指数较高，一般可达0.96 mm，是保温的主要因素；针毛具有网格的髓质，是保温结构力学方面具最佳特征；针毛的皮质层较薄，四肢下内侧毛与背毛、腹毛结构也不相同，这是它适应高原严寒，缺少季节变化的重要特征（陈民琦，1991）。

白唇鹿头骨额面部宽于其他鹿种（如马鹿）1 cm，泪骨宽而深，颅骨长和宽随年龄增长，其颌骨宽及柄状突也不断增长，这可能有助于具有较多的鼻甲骨，运动中温暖冷气进入肺部，适应高寒环境（Ohtaishi, 1993）。

心脏的解剖证明：心肌细胞线粒体密集，排列不规律，还可见肥大线粒体，从而保证心肌正常供氧（舒世华等，1988）。肺脏的解剖出现完整的纵行平滑肌层，支气管壁上的腺体和透明软骨片具区域性，这可能与调整空气的暖湿度有关。肺泡隔中各种细胞的胞质小泡密度，大多为适应环境而形起细胞结构的改变（李晓滨等，1988）。生殖系统的解剖，特别是雌性生殖系统，雌鹿的子宫粘膜形成特殊的肉阜，都是对环境的适应；由精管的解剖证明生殖能力较低（王晓安等，1996）。内分泌的解剖，证明白唇鹿肾上腺束状带浅层与深层具明显差异。白唇鹿肾上腺髓质内带及外带无明显区分，亦未

见规律性分布（霍金富等，1990）。

七、白唇鹿驯养业开始于1958年，青海省在祁连冰沟首创白唇鹿养殖业，建起了第一个国营养鹿场。在祁连托莱及野牛沟相继建立了养鹿场，随后玉树、果洛州也建立养鹿场，奠定了青海省饲养白唇鹿的基础。甘肃省也发展了自己的白唇鹿饲养业，至1983年止，共有国营及集体鹿场60余个，包括白唇鹿在内的鹿类养殖存栏头数达7000只左右。

国内动物园养殖起始于1958年，北京动物园在1961年成功地进行了繁殖，目前国内有13个动物园和3个驯养繁殖中心养殖。国外有德国、美国、尼泊尔及日本等国动物园养殖约20头白唇鹿。

鹿场一般采用放牧或放牧结合圈养补饲的方法饲养。喜食的植物、较喜食的植物及可食植物大约85种。放牧后的鹿群，特别是雄鹿应补饲精料，动物园养殖中特别注意降温、防病。白唇鹿的疾病主要有肠毒血症、痢疾、消化不良、肺炎等9种。

鹿场及动物园养殖中的白唇鹿繁殖交配期在9~10月份，一般雌鹿1年1仔，3年2仔或隔年1仔。仔鹿饲养中注意室温，在哺乳中的雌鹿适当增加足量的磷酸氢钙，60日龄即可断乳。

八、白唇鹿的现代分布已呈岛状，且分布密度较低，估计总数在15800头左右，全部分布呈15个岛状分布区。究其逐渐减少的原因，一方面仍有人不断偷猎和不断增长的家畜对草场竞争，另一方面白唇鹿本来繁殖率较低，雌鹿一生产仔平均7~8只，且产仔当年并不受孕，雌鹿繁殖率一般为26%~52%，又加上近10年来的屡次严寒雪灾，故数量逐步减少。

岛状分布的状况是物种逐渐减少衰退的表现。在“岛”内血液交换减少，食物选择面减少，隐蔽场所及避敌区域缩小，影响繁殖率，最后衰退而灭绝，是物种“濒危”的信号。

我国现建的白唇鹿保护区7个，拟建的3个。巩固现有的保护区，建立保护网络，并提高管理级别，是主要手段之一。增强全民保护意识，杜绝偷猎事件发生。国际狩猎也要注意了解种群状况，特别是岛状分布的种群“哪怕是猎取1头雄鹿，可能导致整个种群的最后崩溃”。繁殖研究课题，今后也将成为动物学工作者注意的内容。

Abstracts

I. The formation of the continent is based on the "Theory of the Continental Drift" of Wegener A. (1912) . The changing of the continent caused the climate and the ecology system changed greatly. About 50 000 000 years ago, from Eocene to Oligocene, Tertiary, when the Indian Plate drifted towards north, it pressed against the Eurasia. Its north edge embedded under the Eurasia. That formed the Himalayas.

Deer developed from the *Archaeomeryx optatus*, the *Archeaomerys optatus* is the fossil deer genus found only in the Inner Mongolia in China. The significance of finding the *Archeaomeryx optatus* is that the central place of the origin and evolution probably was in the mid - north China. China is abundant in fossil deer. The fossil deer found in China until 1974 belonged to 5 families, 7 subfamilies, and 84 species. The fossil rusa and fossil pseudaxis, which ever distributed in Eurasia, evolved from the *Archeaomeryx optatus*. The white lipped deer evolved under the certain condition of the plateau, and its fossil of Pliocene, Tertiary, was only found in Rum County in Tibet.

China is abundant in living deer resources. It has the most deer species and genus. The statistics shows that it has altogether 3 family 4 subfamilies and 23 species 38 subspecies. That accounts for 45.8% of the world deer resources of 48 species. Therefore, it is also regarded as the main area of the Systematic Evolution and the Geographical Distribution of the deer resources.

II. The white lipped deer distribute in Qingzang plateau, including Qinghai province, Tibet, Gansu province, the western area of Sichuan province, and the northwestern area of Yunnan province. Judging from the administrative area, it distributes in 5 provinces, 18 cities, 68 Counties.

There are four municipal areas and eighteen counties in Tibet. Ecogeographically, these areas lie to the north of the Yaluzangbujiang River and between the Gangdisi - nianqing-tanggulashan and Hengduanshan Mountains. The geozoological distribution happens to be within the Eastern rocky region of Tibet.

There are six areas and nineteen counties in Qinhai Province. Actually, these areas can be divided into four parts. The first part of distribution is the Haibei region of the Menyuan

and Qilian counties. The second part of distribution is the eleven counties of Yushu and Guoluo regions that lie in the middle area of Qingzang plateau and the origination of the Changjiang River. The third part is the Wulan and Tianjun counties, which lie in the Haixi region. The last part is an isolated distribution, the Jianzha and Hainan counties of Haina region, which is in connecting with the Maqu County of Gansu Province.

There are four regions and twenty counties in Sichuan Province. Ecogeographically, it lies among the Shalulishan Mount – Daxueshan Mount – Gonglaishan Mount region.

There are three regions and six counties in Gansu province. It starts from the northern slope of the Qilian Mountains to the edge of the Xinjiang Province westwards.

There is only one county in Yunnan province.

There is not an agreement on the geographic distribution. The north latitude may start from 29° to 29.5° and end at 38.7° to 40° . The east longitude may start from 92° to 92.5° and end at 102° to 120° .

III. It is suggested to use the Simpson system to classify the white lipped deer. In addition, the deer sub – families of Cervidae, *Moschinae*, *Muntiacinae*, *Cervinae* and *Odocoileinae* still are used. In taxonomy, the white lipped deer is a special species in cervus. In 1982, based on the study on the chromosome of the some species of the cervus, Wang zongren put forward the theory of its evolution, that is its evolution mechanism is the “Robert’s Fragmentation”. Through the comparison between the fossil material and the law of the mechanism, he pointed out that the Eld’s deer and rusa deer are of the oldest species of the deer. Then there were the white lipped deer, Sika deer and red deer. The correctness of what he had pointed out was proved by the experiment of electrophoretic analysis of the serum protein in Cervidae – SDS – page in 1988. The blood relation among the cervus in turn was rusa deer, the white lipped deer, the red deer, and sika deer. And after the experiment of Electrophoretic analysis of the isozymes in Cervidae – SDS – page in 1996 Wang yunling had the result that sika deer shares the closest relationship with red deer, then with the white lipped deer. These analyses are in accordance with the study on the taxonomy of the cervus.

All these evidence have proved that the white lipped deer was an ancient branch of deer evolved from rusa deer.

IV. The white lipped deer living in the Qingzang plateau in China is the typical high – altitude animal. Its distribution area is very cold and dry. The rainfall ranges from 200 to 700 mm per year. The average temperature ranges from -20°C to 0°C . The forestry lies between 3500 to 4000 meters of the latitude. The above area is marshland. There are four kinds of conditions that the white lipped deer usually inhabites. They are plateau desert (above 4300 metres), Alpine meadows (3700 – 4300 metres), Alpine shrubby (3600 – 3900 metres), and alpine forest – grassland (3500 – 4000 meters)