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Introduction

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The Przewalski's horse is an endangered species and is extinct in the wild. Only captive propagation in zoos has rescued the species from total extinction. At the end of World War II, there were thirty-one horses in captivity of which only nine reproduced. As a testimonial to the efforts of zoos to save this species, there are over a thousand Przewalski's horses at the time of publication of this book.

The size of the captive population has grown to the point where sufficient animals are available for reintroduction to the wild. The political climate is also favorable for cooperative efforts to return this species to the wild. If reintroduction attempts succeed, as seems probable, we will be able to add another species to the small number of successes aimed at slowing the accelerating rate of extinctions on this planet. While it is too late for other prehistoric mammals such as mammoths, we still have the opportunity of returning to the wild one of our other prehistoric co-habitants (see pages 5, 56). Indeed Przewalski's horses are already in semi-reserves in the Xinjiang Province of China where the species was last seen in the wild as well as in Takhi-Tal and Hustain Nuru in Mongolia, in preparation for their release into the wild.

There are two practical reasons for compilation of existing information on Przewalski's horses. Heretofore, comparatively little has been published about the Przewalski's horse. The few published references are difficult to obtain, and there is much informa-

tion that has never been published. The pre-eminent compendium on the species was written by Erna Mohr in 1959 and translated into English in 1971. Although Mohr's book can never be surpassed for its firsthand accounts of the early history of the species and its extensive illustrations, much has happened since this book was written. At the time of its writing the technology that we take for granted in studying the horses today was not yet available. At least twenty different research projects on various aspects of Przewalski's horse biology have been conducted in the past two decades and several international conferences concerning this species have been held. Secondly, when the horses were fewer in number and in fewer zoos, sharing information was much easier. Within the past decade the number of zoos holding Przewalski's horses has increased by 50% and now that there are over one-thousand animals in more than one-hundred twenty institutions (Volf 1981, 1991), it has become much more difficult to keep abreast of current knowledge. We felt the time had come to gather all information on Przewalski's horses in one place, to update what was known, provide easy access to the knowledge, and point out areas needing further research. This is especially important in light of attempts to reintroduce Przewalski's horse into the wild.

In order to facilitate the task of the keeper, veterinarian, and curator, especially in institutions which have not had Przewalski's horses before, information is presented on nutrition, management, potential behavior problems, and veterinary care of the animals. The value of these animals, which to some are not as charismatic as other endangered species, will become clear to the caretakers when they read the history of the species, both recent and paleontologic, and recognize the behavior patterns of their charges.

This volume should also serve as a guide to those embarking on research on Przewalski's horses. The research director will have a single source to begin a potential investigator's training. There are several reasons why continued research on Przewalski's horse should yield important theoretical information.

Domestic horses (*Equus caballus*) are those which are currently associated with, and under the control of, humans. Feral *E. caballus* are those, or descendants of those, which were once domesticated but have escaped captivity and are now essentially self-sufficient. All free-roaming horses in western North America and on the barrier islands off its east coast fall into this latter category. The only truly wild horse, for comparison with domestics is the Przewalski's horse, also referred to as the Asiatic or Mongolian wild horse.

Humans have long been interested in horses. Many of mankind's earliest artworks depict prehistoric horses. Horses were a source of food, and hides for clothing and shelter. Hooves, bones, and other connective tissues were used to make implements and glues. Eventually the horse revolutionized transportation, affecting agricultural practices, warfare, sports, and the mobility of human societies. Carrying riders and their belongings, pulling plows, carts and chariots, the horse, along with the dog and the cat, became our closest animal companion. Only the horse and the dog have so consistently and universally been "trained," necessitating a thorough understanding of their behavior and involving interspecific communication (whether realized on the part of the human participant or not). Although the horse is no longer an important source of transportation in industrialized societies, millions of people still own horses for aesthetic, recreational, and utilitarian reasons, as well as enjoying their companionship. Interest in these fascinating animals remains high.

Unlike the dog, where wild species closely related to it are ubiquitous and readily observed, wild relatives of the horse are rare. Wild zebras, asses, and onagers are neither ubiquitous in many parts of the world, nor very closely related to domestic horses. Imagine, then, the excitement generated when the existence of Przewalski's horses on the border between China and Mongolia became known to the western world. Within a short time it was realized that *Equus przewalskii* Poliakov, 1881, was the closest living relative of the domestic horse (*Equus caballus*). As such, they were of extreme interest for comparison with familiar domestics. Just how much do they differ physically and behaviorally from domestic horses?

Przewalski's horses conform to other wild equids in body size, and like other wild equids have short erect manes and a standard coat color. They are of interest in clearly showing how humans have selected for different sizes, coat colors, and long flowing manes in domestic breeds.

Przewalski's horses are also of intense interest as an example of evolution at work. One species is thought to give rise to two, when different populations of the same species become reproductively isolated from one another. With no intermingling of genetic material, enough changes accumulate over time that eventually the populations can no longer interbreed. The equid species show this process in action. Although domestic horses and Przewalski's horses have different chromosome numbers, they have not yet diverged sufficiently to make hybridization impossible. The two in-

terbreed freely and the offspring produced are fertile. Horses and asses show the next step in divergence; although the two species can hybridize, their offspring (a mule) is sterile, because the chromosomes from either parent are not sufficiently similar to pair properly at meiosis.

In addition to pointing out intriguing ideas for research, we hope that this volume will be a valuable reference to zoo curators and keepers, zoo veterinarians, and biologists charged with caring for Przewalski's horses in captivity and implementing their reintroduction. The book may also be helpful to those interested in the conservation and reintroduction of endangered species in general. The Przewalski's horse studbook is the model upon which other species' studbooks have been based, and it is hoped that their return to the wild will serve as a model for the reintroduction of other species. This volume may also be of interest to horse enthusiasts, and those biologists with an interest in particular topics such as nutrition, genetics, or behavior.

Assembling information for the book was an international effort. Such international collaboration is essential for the well-being of the horses in our care, and will be critical for reintroduction attempts to be successful. If this book fosters international cooperation, contributes to the dissemination of knowledge about Przewalski's horses, stimulates further discussion and research, helps to improve the care of Przewalski's horses in captivity, and improves their chances of a successful return to the wild, we will consider our job to be well done.