

Przewalski's horse —putting the wild horse back in the wild

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Efforts are under way to re-establish free-living populations of Przewalski's horse *Equus przewalskii* from zoo-bred individuals. The time is opportune to begin such initiatives as there are more than 660 individuals dispersed in over 70 zoological collections. In addition, the captive population is now increasing rapidly and has the potential to provide reasonable numbers of animals for reintroduction programmes without jeopardizing the maintenance of the population that serves as an ex-situ gene pool nucleus.

The Asian wild horse, or Przewalski's horse *Equus przewalskii* is the only true wild horse alive today. Numerous populations of feral horses, derived from domesticated ancestors, are found on nearly every continent. It is believed that Przewalski's horses have never been successfully domesticated. There is not universal agreement that Przewalski's horse is distinct—as a species—from its domestic relatives. Domesticated horses and Przewalski's horses can interbreed and the first hybrid generation and backcrosses are fertile (Short *et al.*, 1974). Indeed, a hybrid produced in captivity in 1906 now figures in the pedigree of nearly two-thirds of the zoo population (Mohr, 1959; Volf, 1964 *et seq.*). However, the Przewalski's horse has a diploid number of 66 chromosomes, whereas all normal domestic horses have 64 chromosomes. In addition, Przewalski-specific serum proteins have been identified (Fisher *et al.*, 1979; Bowling and Ryder, 1987). The recent analysis of DNA for seven extant species of Equidae not only places *E. caballus* (domestic horses) and *E. przewalskii* as closely related taxa on a separate branch of the horse family tree (i.e., caballine horses), but also suggests that their ancestors diverged approximately 250,000 years ago, well before the appearance of domestic horses approximately 5000 years ago (George and Ryder, 1986).

Przewalski's horse is believed to survive now only in captivity. Annual investigations by the

Joint Mongolian–Soviet Expedition have consistently failed to uncover indications of the persistence of wild populations of the species. The most recent sightings were reported to have been in the summer of 1968. It should be noted that all possibility of remnant populations has not been completely ruled out. Aerial survey information could be very useful in this regard. Nonetheless, the best current hope for restoring the species to its historic range lies with efforts to reintroduce populations from captive-bred stock.

The type specimen was collected in Mongolia. However, there is every reason to believe that ancestors of the remnant populations documented by Polish geographer N. M. Przewalski to be present in Mongolia in the latter decades of the nineteenth century once roamed more widely in the steppe habitat of central Asia, China and even western Europe. (Horses with features highly reminiscent of Przewalski's horses are found in the cave paintings of Lascaux in France, for example).

Restoration of the species to its natural habitat has long been a goal of the breeders of Przewalski's horses. The first captive breeding of the species occurred at Askania Nova, the Ukrainian estate of Baron Eduard von Falz-Fein. Today the single largest collection of wild horses resides at Askania Nova and figures prominently

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A wild horse and foal at Whipsnade Park (Michael Lyster, Zoological Society of London).

in world-wide gene pool management of the captive population. One of the first major European breeding herds was constituted at Woburn Abbey in the UK, at the turn of the century, by the 11th Duke of Bedford. Five international conferences dealing specifically with the subject of the conservation and captive breeding of Przewalski's horse have been organized by the zoological gardens that exhibit and breed the species. At the most recent symposium, held in 1980 at Marwell Zoological Park, UK, the genetic and demographic status of the captive population were detailed and, in the concluding resolutions, the restoration of the species to its former habitat in Mongolia was again endorsed (Knowles, 1984).

The animals are now available for a reintroduction programme and the participation of the zoological gardens is assured. Important biological issues remain to be addressed, however, *Przewalski's horse reintroductions*

before restoration projects can get under way. The single most significant challenge that must be addressed is the fostering of international co-operation between the governments of countries within the species's original range and those countries where the nucleus of the captive gene pool resides, so that a workable plan for a restoration project that maximizes the chances for successfully establishing a viable population of free-living animals can be enacted.

In this regard, the outcome of an FAO and UNEP-sponsored consultation held in Moscow in May 1985 provided some direction for future efforts as well as providing an illustration of the potential difficulties involved in multinational reintroduction efforts. Considerable progress was made in Moscow in elaborating guiding principles for the creation of a free-ranging, self-propagating population in the wild. Criteria for selection of animals, including genetic and

health traits, site criteria, and numbers of horses recommended as a minimum for the ultimate population size were elaborated. Consensus on other significant issues, especially those concerning restoration of free-ranging populations to the Mongolian People's Republic, were not so easily reached. Thus, no clear choice of site within Mongolia could be agreed upon. The Great Gobi National Park was briefly considered as a site because of its protected status and the ongoing ecological monitoring occurring there. However, the extremely arid conditions (0–100 mm annual rainfall) and lack of suitable forage suggested that initial success of an acclimatized population might be rather low and, furthermore, there was concern that the carrying capacity of the entire project area might not sustain a viable population in the long term. Other areas within Mongolia were considered in light of the available knowledge of ecological factors and in terms of accessibility. None of the recommended potential locations had been surveyed by the Joint Mongolian–Soviet Biological Expedition specifically in terms of suitability for populations of free-ranging equids, nor did knowledge of range conditions in the winter exist. Consequently, it was recommended that a small group consisting of experts in the ecological and nutritional requirements of feral horses should visit the sites in winter and also, if necessary, in summer.

Przewalski's horses have been bred through twelve generations in captivity. Considerable inbreeding has occurred and other aspects of pedigree structure have diminished genetic variability in the captive population. Studies by MacCluer *et al.* (1986) and Thompson (1986) suggest that as many as two-thirds of the genetically neutral alleles have been lost. These same analyses also suggest that the remaining genetic variability is at little risk of loss given that appropriate pedigree management is applied. For this species, selection, inbreeding, drift, and introgression of domestic horse genes have altered the gene pool. Thus, it was recognized at the Moscow consultation that an appropriate period of acclimatization of selected animals to the environmental conditions near or adjacent to the release site would be necessary in order to increase the likelihood that released animals

would adapt to the new conditions.

The recent success of the Arabian oryx reintroduction programme in the Sultanate of Oman, involving acclimatization of young oryx first to zoo-like enclosures adjacent to the release site and then, after appropriate social groups were formed, introduction to a very large enclosure (100 ha), considerably influenced the planning for the Przewalski's horse reintroduction. In the Arabian oryx project in Oman, the release of zoo-born oryx followed the development of a stable social organization as well as evidence that the full range of social and sexual behaviour had been developed within the herd (Stanley-Price, 1986). The release itself was designed to be a smooth transition from living inside the fence to living in the open desert. The habituated and dependent animals gradually became familiar with increasingly larger portions of the desert. A similar set of separate stages intended to lead to the eventual release of the first band of Przewalski's horses in 1991 was incorporated into the action document arising from the Moscow meeting (FAO, 1986).

Officials from the Mongolian Forest Ministry participating in the FAO consultation expressed the opinion that one of the potentially major problems facing the reintroduction project, the complete restriction of any interaction between Przewalski's horses and domestic horses, could be managed by local eradication of feral horses in conjunction with choice of a site where feral horse populations were low or absent. Even with an adequate solution to the feral horse problem, concern persists for the long-term safety and stability of a free-ranging population of Przewalski's horses in any reintroduction project.

Since the May 1985 FAO consultation in Moscow, relatively little information has been forthcoming concerning the progress on the action plan. Some Soviet sources have indicated that little progress may be expected in the near future in the Mongolian project. In fact, concerns that were raised during the Moscow consultation about the likelihood, in the short term, of organizing a successful project in Mongolia, reinforced the concept of having several reintroduction projects for Przewalski's horses. To this end, a specific recommendation arising from the Mos-

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cow consultation was to request that scientists in the Soviet Union identify areas of central Asian steppe habitat for suitable sites for a Przewalski's horse reintroduction. Recently, Soviet conservationists have raised the possibility that land and facilities in Soviet central Asia may be available for use as an acclimatization area for Przewalski's horses, and that a suitable expanse of steppe in the vicinity of the acclimatization area might ultimately be available for establishing a free-ranging population.

Increasing co-operation among institutions breeding Przewalski's horses now ensures more fully that gene pool preservation goals will shape the design of captive-breeding programmes into the future (Ryder and Wedemeyer, 1982). Regional co-operative management programmes are in place or under development in North America (through the Species Survival Plans of the American Association of Zoological Parks and Aquariums), continental Europe (through the Europäisches Erhaltungszuchtprogramm), United Kingdom (through the Federation of Zoos of Great Britain and Northern Ireland), and in the Soviet Union (through the All-Union Association of Zoological Parks). All regional efforts are co-ordinated by the International Studbook Keeper of the Przewalski's horse (Prague, Czechoslovakia).

Efforts are under way as part of the regional programmes to provide facilities that will be suitable for creating breeding herds of Przewalski's horses that can be monitored as model systems to enlarge the base of available data on nutrition, behavioural and reproductive biology in support of the pending reintroduction efforts. Thus, enclosures offering large areas in which the horses may freely graze, adapt to local environmental conditions, and develop and display a full repertoire of social interactions exist now in Colorado, USA, Alberta, Canada, and the Ukraine, USSR.

In China, an acclimatization and breeding station for wild horses has recently been created near Urumchi in Sinkiang Province, within the historic range of the species. The horses currently at the Urumchi site represent a rather closely related assemblage of breeding stock and are not yet fully representative of the gene pool available world-wide. Chinese conservation officials have

indicated that the design of a programme for acclimatization, breeding, and eventual release of wild horses is currently under way. Additional transfers of horses from bloodlines under-represented in China, for example from Munich-bred stock, are in the planning stages.

Central Asia is believed to be among the first sites of domestication of horses, and the horse still figures centrally in the cultural fabric of the descendants of the once-nomadic peoples of the steppe. With the co-operation of national and local governments, non-governmental organizations and zoos, and with public support, the sound of hoofbeats from herds of wild horses may again resound on the steppes of central Asia.

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