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# Protection of Endangered Species

The interplay between aesthetics, law, economics and evolution



ANDREAS R. HASSL,  
professor at the Medical  
University of Vienna.

In 1982 Austria joined the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). The aim of the signatory states, which presently number 175, is to protect endangered animal and plant species by restricting transnational trade in them. A complex body of regulations based on CITES has been established through several legislative acts of the European Union and national legislatures that hinders the transport of certain higher organisms, parts of them and products produced from them through bureaucratisation. The actual goal of CITES, that of reducing the removal of wild specimens from their natural habitats, is unfortunately barely discernible any more. Implementation of the increasing body of regulations causes considerable frustration, both among citizens affected by the norms, who are mostly not legal experts, and the responsible public security bodies, which tend to have little familiarity with natural history. This essay seeks to point out the points of friction between terms that are used both in the legal and biological fields but are not consistent in content, to shed light on the meaning of biological terms and to present the biological processes that are intended to be influenced by CITES. An appraisal of the prospect of succeeding in protecting plant and animal species by counteracting natural selection through trade-restricting legislation runs through the essay.

**T**he implementation of national and international legislation is the core task of public security bodies. The protection of animal and plant species, nature conservation and the protection of the environment are often in the focus of public interest. Despite the generally high acceptance of such legislative measures among the public, some restrictions, often due to specific occurrences, lead to conflicts of interest. Taking the example of international and national legislation designed to protect threatened animal species, I will present the areas of conflict between the intentions behind the regulations, the pragmatic in-

terests of parts of the population and the resulting issues concerning implementation of the law by the officials (chiefly police and customs officials) responsible.

## A. A PARADIGMATIC EPISODE: THE EXTINCTION OF THE AUROCHS

Once, 200,000 years ago, the aurochs (scientific name: *Bos primigenius*), Brehm's<sup>1</sup> primeval animal, ruled the forests and grasslands. Originally the wild cattle inhabited vast swathes of Europe, North Africa and West Asia in several subspecies. Aurochs cattle were among the most impor-

tant prey hunted by Stone Age man of central Europe, while they were domesticated elsewhere in the Middle East, Southern Europe and India some 9,000 years ago. All European domestic cattle breeds and zebu cattle derive from their genetic material; these are therefore still aurochs cattle, subjected to human-controlled selection over a millennium. Their wildness and increasing rarity made the wild cattle the desired prey of the big-game hunters of the Middle Ages and hunting horns and drinking horns from their horns become sought-after rarities. The disappearance of their habitats, competition from grazing cattle and poaching caused their stocks to shrink to the point that the lords of some of the refuges of the aurochs recognised that the wild cattle would die out without protective measures. For that reason, several protected areas were created in the 16<sup>th</sup> century, the best known being the preserve in the forest of Jaktorów near Warsaw. In 1564 there were eight old and three young bulls, 22 cows and five calves. In 1599 there were still 24 animals, but by 1602 their number had fallen to four. In 1620 just a single cow remained, Europe's last aurochs, which died in 1627. The well-intended protective measures may well have spelled the end of the aurochs: the aurochs proved to have extremely low resistance to stress within the herd and to epizootics aggravated by such stress.

## **B. THE KEY IDEA: SPECIES PROTECTION AS A SOCIAL DUTY AND TASK OF THE SECURITY FORCES**

Thoughtless or even intentional damage to domestic flora and fauna for self-interested profit or vanity is viewed by our society as a violation of its values and sanctioned accordingly (Hassl et al. 2011). Damage to ecosystems more distant from us, however, carries significantly less stigma and

sometimes, for example, in some cases of ecologically damaging tourism, even increases the reputation of those concerned. Nature conservation has a particularly arduous task if such damage is of a discreet nature, i.e. does not have immediate and evidently undesirable consequences. Every continual removal of specimens of an individual animal or plant species from a habitat damages that habitat in the long term and, after a certain time, irreparably, regardless of whether the motives underlying the removal are honourable or not. The societies of most of the world's countries agree in their value canons that damage to their own natural habitats, at least for motives seen as dishonourable, should be prevented. Based on that consensus, the majority of states (175 of the 194 currently recognised by the UN) created an international convention, CITES, designed to prevent excessive and selective removal of fauna and flora from the habitats valuable to the given society by means of trade controls and turnover restrictions. However, these protective measures only apply to those organisms that the society setting the legislation by internal consensus perceives as "useful", aesthetically appealing and rarely occurring, as demonstrated in the opening episode. In other words, protection is only granted to those non-parasitic<sup>2</sup> higher organisms<sup>3</sup> which are claimed, often without checks, to be in the process of dying out at least locally and that have trade "value" for society.

The noble aim of protecting endangered animal and plant species, based on the ethically dubious categorisation into those "deserving of protection" and "the others", is ultimately thwarted, if the extinction of a species has a natural cause. According to cautious estimates of the Earth's biodiversity (= the diversity in the living world) there are some 20 million species of higher organisms (= eukaryotes) (May

1998); assuming a (vertebrate) species has an average existence of a million years, there is a natural extinction rate of approx. 20 animal and plant species per year. These species which necessarily become extinct cannot be prevented from their demise by any legislation in the world or any biological species preservation programme, and the attempt should not even be made. The task of expedient species protection therefore is to distinguish between extinction caused by humans and natural extinction and to prevent the former by changing behaviour or through legislative measures. The problems of implementation of the law resulting from the failure to make such a distinction are currently chiefly burdening the law enforcement agencies, which are supposed to solve scientific or, more accurately, aesthetic dilemmas by legal means.

Species protection is a subject matter that combines ideology, lawmaking and phylogeny (evolutionary development of an organism) and is strongly influenced by the fields of legal philosophy, ethics, economics, ecology, taxonomy and nomenclature. In this essay I wish to shed light on the interactions between the various biological fields and lawmaking established by CITES.

### **C. DEFINITION OF TERMS: NATURAL SCIENTIFIC BASICS FOR LEGAL EXPERTS**

Species protection legislation, as mentioned earlier, is the attempt to protect biological species from dying out using legal norms. That involves the legal interpretation of natural scientific concepts. In order to avoid misunderstandings it should be noted from the outset that the German biological terms “Art” (species) and “Gattung” (genus) bear no relation to the legal terms “Speziessache” and “Gattungs-sache”.<sup>4</sup> Forearmed with that knowledge, the citizen presumes that the legislator has

provided a legal definition of the key object of species protection legislation, the biological species. Indeed, we find a definition in Article 2 of Council Regulation (EC) No 338/97: “For the purposes of this regulation ‘species shall mean a species, subspecies or population thereof’. That is the taxonomically incorrect<sup>5</sup> translation of Article 1 of CITES, which is as follows: “For the purpose of the present Convention, unless the context otherwise requires: (a) ‘Species’ means any species, subspecies, or geographically separate population thereof.” This definition, which sheds little light on the nature of a “species”, requires terminological interpretation according to Austrian rules: a literal interpretation combined with a teleological interpretation brings us to the conclusion that the biological species term is to be applied to the law as in natural science. Since CITES only extends to organisms currently existing on Earth, and with a few exceptions only vertebrates and flowering plants<sup>6</sup>, in my opinion, the term “species” refers to a biological species as understood by Mayr (Mayr 1979): a species is a group of individuals that can procreate with one another and produce fully fertile offspring. This definition, however, can identify organisms as species that are clearly different based on visual characteristics (e.g. dog breeds), but can also include morphologically similar organisms that cannot procreate with one another (domestic cattle breeds) in the case of an incorrect classification. New knowledge concerning classification and diagnosis of species tends to enter biological taxonomy very quickly, but its legal implementation can lag seriously behind on occasion.

Determining whether a biological form is a subspecies, species or a higher unit (e.g. a genus) is the task of taxonomy. It is the subfield of biosystematics that defines taxa (= units in a hierarchical system) and

Source: Hassl

	Eggs	Juvenile form	Adult form
Human		Child, adolescent	Adult
Cattle		Calf	Cow, bull
Bird	Egg	Chick	Hen, cock
Reptiles	Egg	Young	Reptile
Batrachians	spawn	Tadpole	Frog, toad ...
Fish excluding sturgeon	In the body: roe; otherwise: spawn	Larva	Adult fish
Sturgeon, and incorrectly also salmon	In the body: caviar; otherwise: spawn	Larva	Sturgeon, salmon, trout ...
Insects, general	Egg	Larva with pupae or nymph	Imago
Butterfly	Egg	Caterpillar and pupae	Imago
Adult fly	Egg	Maggot	Fly
Lump fish	Caviar alternative	Larva	Lump fish
Grapevine snail	Snail caviar	Young snail	Grapevine snail

#### Colloquial names of animals and their stages

records the relationships between living organisms (and viruses) in a hierarchical system (Fischer 2012). This system is designed to reflect the phylogeny, i.e. the evolutionary history of organisms. Taxonomy has become very dynamic in recent years based on the analysis of genetic characteristics, whereby the allocation of given taxa to generally known groups in line with up-to-date scientific knowledge has become much more difficult. To give an example: not every member of the domestic cattle category derives from the aurochs, so “domestic cattle” is not a taxonomical unit. It should be noted that there is criticism of this constantly updated taxonomy, since it is impractical, especially for users that are not taxonomists, and the gain in knowledge is doubted (Holzner 2012).

A result of the current major changes in taxonomy is the continual new naming and renaming of animal and plant species. The technique of naming organisms is nomenclature. It is tied to a strict, internationally binding body of rules in the field of zoology and botany<sup>7</sup> (Fischer 2012). One of the most important rules is the naming of (higher) organisms with a binominal name, which is composed of the name of the next highest systematic unit, the genus, followed by a species name (e.g. *Bos primigenius* for the aurochs). The pri-

ority rule with regard to naming says that older names essentially take precedence over newer names published later.<sup>8</sup> Two essentially different approaches come into conflict during the use of names: while in law, the rule is that incorrect naming is inessential (“falsa demonstratio non nocet”), biologists are strictly tied to the rules of nomenclature. In some cases that leads to one and the same name suddenly referring to a quite different biological species, to which a different protective status is assigned, as a result of rectifying the priority of an original description. To avoid such discrepancies, the German popular names are given alongside the scientific names when listing protected organisms where available by the Council of the European Union (Council Regulation [EC] No. 338/97) and in every case by the Commission (Commission Regulation [EU] No. 101/2012). These names are descriptive and helpful during legal interpretation if changes have occurred to scientific names, but can understandably only be used in cases when fauna and flora have long been known in German-speaking areas and have historically established names. In other cases they are frequently ambiguous, invented names without consensual recognition, such as the “Gelbfleckenschlange” (gold-spotted snake), which is also named

“Breitkopfotter” (broad-headed adder) or “Breitkopfschlange” (broad-headed snake), though the latter names actually refer to two different biospecies (*Hoplocephalus bungaroides* and *H. stephensi*).

The antonym of the phylogeny of taxa is the individual development (ontogeny) of organisms. Defined somewhat inexactly by Ernst Haeckel in 1866, this is the development of the individual (higher) organism from the impregnated egg cell to the adult specimen.<sup>9</sup> All multi-cellular animals develop from a viable egg via one or several non-sexually mature juvenile forms, which are generally called larvae in the case of clearly distinguishable stages of life, to sexually mature specimens, namely adults. In the case of some higher plants and some lower animals, asexual forms of multiplication occur (e.g. trailers, bulbils, shoots, root tubers etc.) obligatorily or optionally, for example, flukes can multiply both sexually and asexually. The eggs, juvenile stages and adults of animals often have their own historically developed names, some of which are listed here by way of example (see table, page 87).

Protective measures as per CITES always encompass all the stages of growth of an animal, and frequently also parts and products. Caviar and roe are regarded as organs or organ parts, rather than as collection of individualised eggs. Pragmatically, the hairs of mammals are regarded as non-independent components of skins, hides and furs, while bird feathers, because they are processed individually (?) are deemed to be independent components to which separate rights apply.

#### **D. THE COLLECTION OF NORMS: A BUREAUCRATIC JUNGLE**

Species protection is spread out over numerous European and domestic norms, including legislation on the identification of certain biological species, on animal

Source: © Hassl 2012



Ladies' hat from the 1880s with a complete, taxidermied lesser bird-of-paradise (*Paradisaea minor*), a species listed in Annex B.

protection, keeping of animals, transport of animals, torture of animals, biotope protection (nature and habitat protection), hunting and fishing norms, standardized measures against invasive species, and animal and plant diseases, as well as CITES and the CITES Appendices. Norms directly concerning our topic are:

- ▶ CITES including Appendices I–III, also known as the Washington Convention. Those animal and plant species are listed in the appendices whose existence the signatory states agree is threatened or endangered. These lists are the basis on which international trade restrictions are issued. Austria ratified the convention in 1981 and joined on 27 April 1982.
- ▶ Council Regulation (EC) No. 338/97 governing the import, export and sale of species that are found on special European lists (A–D), which are compiled in an annex, for all EU countries. This regulation is based directly on CITES and suspends the import of certain organisms or parts thereof into the European Union.
- ▶ Commission Regulation (EU) No. 101/2012 replacing the Annex to Council Regulation (EC) No. 338/97 and amending some provisions. This list is currently the valid legal source with regard to protected species.

- ▶ Commission Regulation (EC) No. 865/2006, laying down formal requirements designed to ensure comparable, unified documents and processes within the European Union.
- ▶ Commission Regulation (EC) No. 100/2008 amending and supplementing Commission Regulation (EC) No. 865/2006.
- ▶ Commission Implementing Regulation (EU) No. 828/2011 lifting the suspension of import of some species as per Council Regulation (EC) No. 338/97.
- ▶ Austrian Species Trade Act 2009.
- ▶ Species Trade Insignificance Regulation 2010.

These norms create for the layman a confusing tangle of normal procedures, procedures with reservations of individual states, exceptions for certain qualities and (small) quantities, counter-exceptions, various patterns in the requirements for provision of import and export documents and in certain cases they necessitate the international cooperation of offices and agencies within a specific time window. That creates a state of administrative affairs that must strike citizens as excessive red tape for usually trivial behaviour e.g. import of a souvenir. Customs and police agencies are likewise confronted with a multitude of regulations to comply with. Even clarification of competence – chiefly the Austrian Federal Ministry of Finance and the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management – is not always straightforward. Yet the essential idea behind CITES was simply to name those animal and plant species, based on consensus, where the number of specimens removed from their natural habitat should be minimised. On the other hand, the political intentions of the CITES signatories with regard to influencing national economies may have been

given an ethical sheen, but were clear from the start.

The attempt to create different qualities of organisms in the three Appendices to CITES proved particularly problematic from an ecological point of view:

Appendix I lists all the species of higher plants and animals that are rarely found in nature and where the claim is made that they are threatened with extinction and trade negatively affects or could negatively affect their existence. Transnational trade in such organisms or parts of them is restricted to cases with special authorisation.

The many species listed in Appendix II are not directly endangered, but could become so if their removal from their natural habitats is unregulated. Specimens of Appendix I animal species bred in captivity are deemed to be specimens of species included in Appendix II. The transnational trade in specimens or parts of such animal and plant species is allowed with national authorisation.

Appendix III contains species that are subject to a trade restriction in at least one of the signatory states and whose origin must therefore be checked in the case of trade deals.

Based on CITES, a legal situation was created in Austria today that is based essentially on Council Regulation (EC) No. 338/97 in connection with Commission Regulation (EU) No. 101/2012, with numerous reservations, restrictions and exceptions. That regulation has four annexes, which only follow the wording according to the intention of CITES (amended according to: European Commission 2007):

Annex A contains all species from the CITES Appendix I, except those for which an EU Member State has entered a reservation, and new species, many seemingly without justification from CITES Appendix II and some species from Appendices II and III, for which the EU has agreed on stricter measures within the EU based on

the fauna and flora habitat directive and the bird protection directive. It also contains some species that do not feature in the CITES appendices. Those species which the authorities controlling imports and exports deal with in the context of tourism, such as popular parrot or land tortoise pets, are contained here.

Annex B contains all other species from CITES Appendix II, except those for which an EU Member State has entered a reservation, as well as some species from CITES Appendix III and some species that do not feature in the CITES appendices. In Annex B, corals, cactuses and orchids, especially if “artificially reproduced”, are of touristic relevance.

Annex C contains all other species from CITES Appendix II, except those for which an EU member state has entered a reservation. These are the species that are subject to a special regulation passed by one of the signatory states in their territory.

Annex D contains some species from CITES Appendix II and some species that do not feature in the CITES appendices. These are species where the extent of imports of specimens to the European Union justifies supervision, but clearly does not threaten their existence.

Article 7 of the Austrian Species Trade Act governs the judicial sanctions of legal subjects who import, export, re-export, transit, purchase, offer for sale, acquire, put on display, hold in stock or otherwise use specimens of species listed in Appendices A and B of Regulation (EC) No. 338/97 without permission or certification or in violation of an order by the authorities. The transport of specimens listed in Annex A is also punishable.

Article 2 of the Austrian Species Trade Insignificance Regulation declares violations of Article 7 of the Austrian Species Trade Act as insignificant effects on the conservation status of the species with re-

gard to specimens from Annex A, excepting living or dead animals whose original properties are still essentially maintained and hunting trophies. The transport of material of up to a kilogram in quantity of many of the specimens listed in Annex A is an insignificant effect. This norm thereby overrides the position of the Scientific Review Group as per Section 4 (1) of the Council Regulation (EC) No. 338/97.

### **E. THE RESULT: ADMINISTRATIVE APPARATUS AS THE PROTECTOR OF BIODIVERSITY**

A law containing the term “species protection” in its title, to the mind of every honourable citizen, is aimed at preventing the disappearance of biological species from the world and thereby maintaining biodiversity. As can be recognised, however, every norm based on CITES essentially freezes a dissatisfactory state of loss of diversity in a habitat without changing the behaviour of people that has led to the current state of the global extinction of species. Biological species, however, are continually subject to non-controllable, fateful biological evolution with an unavoidable end. This discrepancy leads to a situation in which species protection involves the undifferentiated hindrance or prevention of “removal of wild specimens” from their natural habitats (Precht 2000, 30) and the law reduced itself to the creator of bureaucracy.

The aim set out in CITES of species protection through trade restrictions requires nuanced appraisal. What is the situation with regard to the countless organisms whose “hidden” species is becoming extinct because we do not distinguish them from a frequent species, or with regard to the protection of those “unlikable” species that live parasitically? The extinction of a parasite is just as great a loss to the biodiversity of a habitat as the extinction of

a spectacular species, though direct pecuniary losses are more difficult to identify. Here the insufficiencies of the “moral” justification of species protection can be recognised straight away. Biological species represent values in themselves, since the value of organisms lies in their pure existence and not in their performance or their usability (Goodwin 1994, 349–357). The self-imposed restriction of protection to organisms that are “important” in a certain context, valuable and loved by us leads ultimately to the ethically dubious creation of habitats in which organisms are merely props for “nature tourism” (e.g. large animals in some African national parks).

The currently desired goal of the legislator cannot be achieved in this way because the formulated wish ignores or even runs against the biological rules of nature. Economic justifications for the protection of a given biological species are straightforward and the targets are mostly achievable using economically justified norms, but they pose a moral dilemma. The question as to why humans engage in species protection can only be answered with the aesthetic argument: because I as a human like the animal or plant and would like to spend my time on earth with a varied palette of other organisms and I hope that the majority of my fellow men think likewise.

Leaving aside commercial trade, there are several areas in the lives of citizens that CITES has an effect on:

1. The transnational acquisition of trophies, commonly called “hunting”, is affected. This form of animal killing, however, is widely discredited in society, because the collection of trophies can degenerate into a pure demonstration of ownership and power (Reiterer 2001, 52–58). It may be economically expedient for communities selling their wild animals to weigh this up against the profit from such business. Precisely such activities, which in many cases are disreputable, are not prevented by the existing regulations, and the transport of trophies even of highly endangered Appendix A animals has not been absolutely excluded.
2. The private keeping of exotic pets, i.e. wild animals suited to domestic care, is also affected. The motive behind such a hobby is often honourable, namely the pleasure in caring for a non-domesticated animal. The aim is to look after the animal in a way that suits the species, meaning the keeper of the exotic pet tries to generate an environment that is comparable to its natural environment in all factors relevant to the given creature (Benyr 2012). The CITES restrictions affect primarily the possibilities of acquiring such exotic pets cheaply after a private removal of the wild animal from its habitat and they hinder access to “throw-away animals”. However, they unintentionally make the keeping of exotic pets an elitist hobby. The publicized introduction of a certificate of expertise in reptile keeping (Benyr 2012) is designed to give private keepers of reptiles, who mostly do not have professional training, the status of experts with corresponding extension of liability as per Article 1299 of the Civil Code of Austria. That includes knowledge of the CITES regulations affecting exotic pets and thereby supports the effort to control trade in wild animals and thereby reduces use of animals without undesirable side effects.
3. Zoos often define themselves as places that preserve threatened species and they see the conservation breeding of rare animals as one of their key tasks. They are particularly affected by the trade restrictions for wild animals, since it is precisely those animals that do not

reproduce well in captivity and are rare in the natural surroundings familiar to the public that are the object of desire of animal keeping that is designed to please the public (cf. Precht 2000, 316–349). The argument of conservation breeding, however, does not hold because, first, the destruction of natural habitats, which is what first endangers the existence of a species, means that successful reintroduction to the wild at suitable substitute locations is reduced to a few exceptional cases, and, second, because wild animals kept in zoos or small preserves, if they can actually survive this form of keeping in the long term, gradually morph into a domesticated form (see the aurochs in the introductory episode). Botanical gardens are mostly scientific establishments rather than being run in a public-oriented way. The considerations for selection with regard to zoo animals apply in an analogous way to garden plants.

4. Businesses dealing in traditional Chinese medicine and other alternative therapies are typically able to import their remedies due to the Austrian Species Trade Insignificance Regulation. However, those private scholars wishing to establish collections of biomaterials that are subject to the CITES regulations without the order of an institution or to transport specimens for museum collections are limited considerably. Whether Europe's societies can really do without such scientific resources in the long term remains to be seen.
5. Items for personal use, souvenirs and household articles are mostly excepted, which means that import authorisation is not necessary even for products from specimens from Appendices A and B. That includes caviar, which can be imported in small quantities without forms. Foodstuffs of animal origin, however,

are frequently subject to animal health restrictions and customs law legislation can also result in additional limitations in terms of quantities.

Implementation of these norms certainly poses a difficult challenge to the police and customs officials. The variety of the possible offences, from pets of dubious origin to the ingredients of “natural remedies” makes it difficult to recognise violations, and the variety of rules and exceptions to them can be comprehended almost by specialists only. More information about the role of the police in species protection would certainly be helpful in order to achieve the declared aim – the protection of threatened species.

An alternative to the current species protection as per CITES would be the non-hindrance of the evolution of biological species; that necessarily includes deliberately not eradicating species, with the possible exception of human pathogens. That is in line with modern considerations of animal and nature protection such as the “right of living nature to the maintenance and development of its genetic inheritance” (Goodwin 1994, 354). In pursuing this line of thought it is encouraging that ultimately the aurochs has triumphed: its genome and thereby essentially its species has outlasted time, albeit in a changed external form. And this modern form adapted to man, the European domestic cattle and the zebu, is present in considerably greater specimen numbers in a far greater area of distribution than the wild form could ever achieve even in its prime. It is unclear whether the evolutionary success of the aurochs was achieved with the help of or in the face of man's “protective efforts” – in any case, the creation of an evolutionary mummy by way of species protection legislation has never succeeded.

However, the fact that there are occasional successes is shown by the Interpol report of 25 July 2012: Operation Cage saw a total of almost 4,000 people arrested for smuggling protected animals or animal products

in 32 states, including Austria. Over 8,700 animals were seized. Trade in protected animals is estimated to come third after trade in drugs and weapons in terms of profit generated from selling illegal products.<sup>10</sup>

<sup>1</sup> Alfred Edmund Brehm (1829–1884), grandfather of animal science, was a zoologist and writer. His book titled “Brehms Tierleben” (Brehm’s Life of Animals) became synonymous with popular scientific zoological literature.

<sup>2</sup> From an ecological perspective, it can be established that more than half of all biological units on Earth, including organisms and viruses, live parasitically, i.e. they rob energy from an organism of another species.

<sup>3</sup> In this context eukaryotic animals and plants are described as higher organisms, that is organisms, whose cells primarily have a cell nucleus and that feed on organic materials or by synthesizing carbohydrates by means of sunlight. The term “animal” is biologically obsolete; in legal science it comprises only vertebrates in the main field, while in the unclear outer field it also includes conchifera, decapods, insects and some other arthropod groups. The sphere of plantae (plants) today comprises mosses and vascular plants. Expressed in rather simplified form, the CITES legislation in question only applies to organisms that are not among the protozoa (= animals!), mosses (= plants!), fungi, bacteria and archaea.

<sup>4</sup> In-depth consideration, however, reveals a connection worth noting: Carl von Linné (1707–1778), the creator of binominal nomenclature, wanted to assign a divine plan in nature with the hierarchical categories of species, genus, class and order to the division into “Speziessache” (unique good), “Genussache”, “körperliche Sache” (physical good) and res as created by man in the field of law in his work “Systema Naturae”, published in 1735.

<sup>5</sup> Mayr (Mayr 1975) defined subspecies as “an aggregate of phenotypically similar populations

inhabiting a geographical subdivision of the range of that species and differing taxonomically from other populations of that species.”

<sup>6</sup> However, how the Commission intends to revive already extinct animals, such as the Tasmanian tiger (*Thylacinus cynocephalus*), which died out in 1936, and protect the recreated specimens as wild species (title of Commission Regulation [EU] 101/2012) is unknown to the author.

<sup>7</sup> The applicable bodies of rules are the International Code of Nomenclature for algae, fungi, and plants (ICN) and the International Code of Zoological Nomenclature (ICZN).

<sup>8</sup> One of the few exceptions is the aurochs, the subject of the introductory episode. According to the priority rules of the ICZN, this wild cattle should actually be called *Bos taurus*, the name given to the domestic cattle originally by Carl von Linné, since European domestic cattle and the aurochs are currently combined in one species. The ICZN decided in 2003, however, that in this special case, the name of the wild form *Bos primigenius* is the valid name.

<sup>9</sup> In the case of parthenogenesis, fertilisation of the egg cell is not required for their development.

<sup>10</sup> Added by the editor.

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