verbreiteter Schwarzschiefer in der Mittleren *praesulcata* Zone zusammen, und ist in Conodonten-führenden Schichten aus den Profilen Trolp (Grazer Paläozoikum) und Grüne Schneid (Karnische Alpen) überliefert. Die darauffolgende Hauptregressionsphase des Hangenberg Events, die mit der kurzen Vereisungsphase auf Gondwana und der Ablagerung weitverbreiteter Siliziklastika (rheinischer Hangenberg Sandstein) und Oolithen (La Serre) korreliert, ist nicht überliefert.

Mit Hilfe der hochauflösenden Conodontenstratigraphie wurden erstmals erhöhte Sedimentationsraten organischen Materials geochemisch nachgewiesen, die zeitlich zusammenfallen mit dem Hauptaussterbeereignis und der Ablagerung des Hangenberg Schwarzschiefers. Damit konnten an der D/C-Grenze ähnliche globale Umweltveränderungen nachgewiesen werden wie an der Cenoman/Turon-Grenze, Frasnium/Famenne-Grenze und Ordovizium/Silur-Grenze, und führten zu einem sechsten großen Massenaussterben der Erdgeschichte.

THE HIGHLY FLEXIBLE FEEDING STRATEGY OF *STEPHANORHINUS ETRUSCUS* (FALCONER, 1859) (RHINOCEROTIDAE, MAMMALIA) DURING THE EARLY MIDDLE PLEISTOCENE IN CENTRAL EUROPE

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The dietary preference of herbivorous mammals is not always very specific and if populations from different habitats are investigated, the dietary signal of a given taxon should not only indicate the dietary spectrum of the taxon under consideration, but also provide information on the general availability of food items in the habitat. Using the immediate dietary interface as a taxon independent pathway should thus allow a well resolving comparison of two biomes more independent from differences in sedimentary and/or taphonomic history, species historical circumstances and time averaging. It therefore should be possible to infer habitats of extinct mammals from differential dietary signals of a single herbivorous species represented in all of the communities compared (KAISER, 2003).

The common and wide spread Plio-Pleistocene *Stephanorhinus etruscus* [including the nominate form *S. etruscus etruscus* and the younger *S. etruscus brachycephalus* sensu GUÉRIN (1980) as well as *S. hundsheimensis* of several authors (for discussion see H.-D. KAHLKE, 2001)] chronologically ranged from the Villafranchian to the early Middle Pleistocene. We have tested, if dental remains of *Stephanorhinus etruscus* from the faunal communities of the lower Middle Pleistocene biomes of Voigtstedt and Süßenborn (reviewed in R.-D. KAHLKE, 2002) reflect remarkable differences of the local food availability in their dietary signals.

The vertebrate fauna of the Voigtstedt clay pit near Sangerhausen (Sachsen-Anhalt), dating from the early Brunhes polarity zone (fauna with *Mimomys savini*), was excavated between 1954 and 1966. The extended fossil material comprises *Bison schoetensacki*, *Praemegaceros verticornis*, *Alces latifrons*, *Equus suessenbornensis*, *E. altidens* and a late (evolved) form of *Mammuthus meridionalis* etc. [monograph: H.-D. KAHLKE (ed.) 1965]. The overall assemblage reflects a fauna of fully developed early Middle Pleistocene character, which has to be assigned to a warm humid period of the Cromerian s.l.

The numerous faunal remains from the Ilm river gravels at Weimar-Süßenborn (Thuringia, Germany) collected from the 19th century up to the 1980ies, reflect an open countryside environment. Besides of *Stephanorhinus etruscus*, the character elements among the larger herbivores are *Soergelia elisabethae, Bison schoetensacki, Capreolus suessenbornensis, Alces latifrons, Praemegaceros verticornis, Megaloceros savini, Equus suessenbornensis*, *E. altidens*, and *Mammuthus trogontherii trogontherii* [monograph: H.-D. KAHLKE (ed.) 1969]. The reflected time span (fauna with *Mimomys savini*) is to be placed within the early Brunhes polarity zone too. Although several climatic oscillations are represented by the sequence, the Süßenborn assemblage indicates cooler and more continental influenced episodes. Both of the rhino populations from Voigtstedt and Süßenborn comprise evolved forms of the Etruscan rhino, which became extinct in Central Europe by the pronounced cooling of the Elsterian cold stage.

Methods

We employed the mesowear method of dietary reconstruction (FORTELIUS & SOLOUNIAS, 2000). Mesowear is based on facet development on the occlusal surfaces of the ungulate upper molar teeth. The degree of facet development reflects the relative proportions of tooth to tooth contact (attrition) and food to tooth contact (abrasion). Attrition creates facets and abrasion obliterates them. We investigate 48 moderately worn upper cheek teeth of *Stephanorhinus etruscus* from Süßenborn and Voigtstedt curated at the Senckenberg Research Station of Quaternary Palaeontology (Weimar). As comparative data, 27 "typical" extant species reported by FORTELIUS & SOLOUNIAS (2000) were used. Statistics were computed using Systat 11.0 and Axum 6 software. Hierarchical cluster analysis with complete linkage (furthest neighbour) was applied. Chi-square corresponding probabilities were computed giving the probability that the null hypotheses of independence should be rejected (at an error probability of 0.05).

Results and discussion

The Süßenborn rhino population is classified in cluster 2 where it shares a sub cluster with the extant reedbuck (*Redunca redunca*), the Roan antelope (*Hippotragus equinus*), and the waterbuck (*Kobus ellipsiprymnus*). The Voigtstedt population is in cluster 4, which contains only browsing extant species. Here it is closest linked to the Sumatran rhinoceros (*Dicerorhinus sumatrensis*), the giraffe (*Giraffa camelopardalis*), and the mule deer (*Odocoileus hemionus*). Both fossil rhino populations thus show different dietary signals ($p < 0.001$).

The Sumatran rhinoceros is consistently recognized as a browser and inhabits hilly country covered by tropical rain forest or mountain moss forest. The species is highly flexible and can survive in a wide variety of habitats, from swamps at sea level to high in the mountains. However, it is never found far from source of water and salt. The reedbuck, the dietary analogue species of the Süßenborn fossil rhino population, is a grazer with a monocot/dicot ratio in its diet of 95%/5% (GAGNON & CHEW, 2000). The Common reed (*Phragmites communis*) constitutes a major component of its forage which is taken close to the water.

The Voigtstedt population thus indicates that a relatively high diversity of food items was available to *S. etruscus*. Thus the rhino of this site behaved like a browser which was probably not very specialized. The much more abrasive components obviously eaten by the same species at Süßenborn incidentally were not eaten by the species at Voigtstedt. There are two possible reasons for explanation: (1) The early Middle Pleistocene Süßenborn biome supported more abrasive food plants as e.g., grass and dicots rich in phytoliths, or grit loaded foliage. (2) *S. etruscus* from Süßenborn had to compete for its preferred dietary niche (that of a low level browser) with at least one of the other herbivorous species. The latter scenario, however, is not supported by the faunal record, leaving habitat differences as the most likely

reason for differential food availability. We conclude drier and more open environmental conditions at Süßenborn compared to the corresponding parameters of the Voigtstedt palaeoenvironment. Furthermore we find *S. etruscus* to be little specific in its dietary traits. It appeared as a flexible feeder well suited as an indicator for subtle habitat conditions related to food availability.

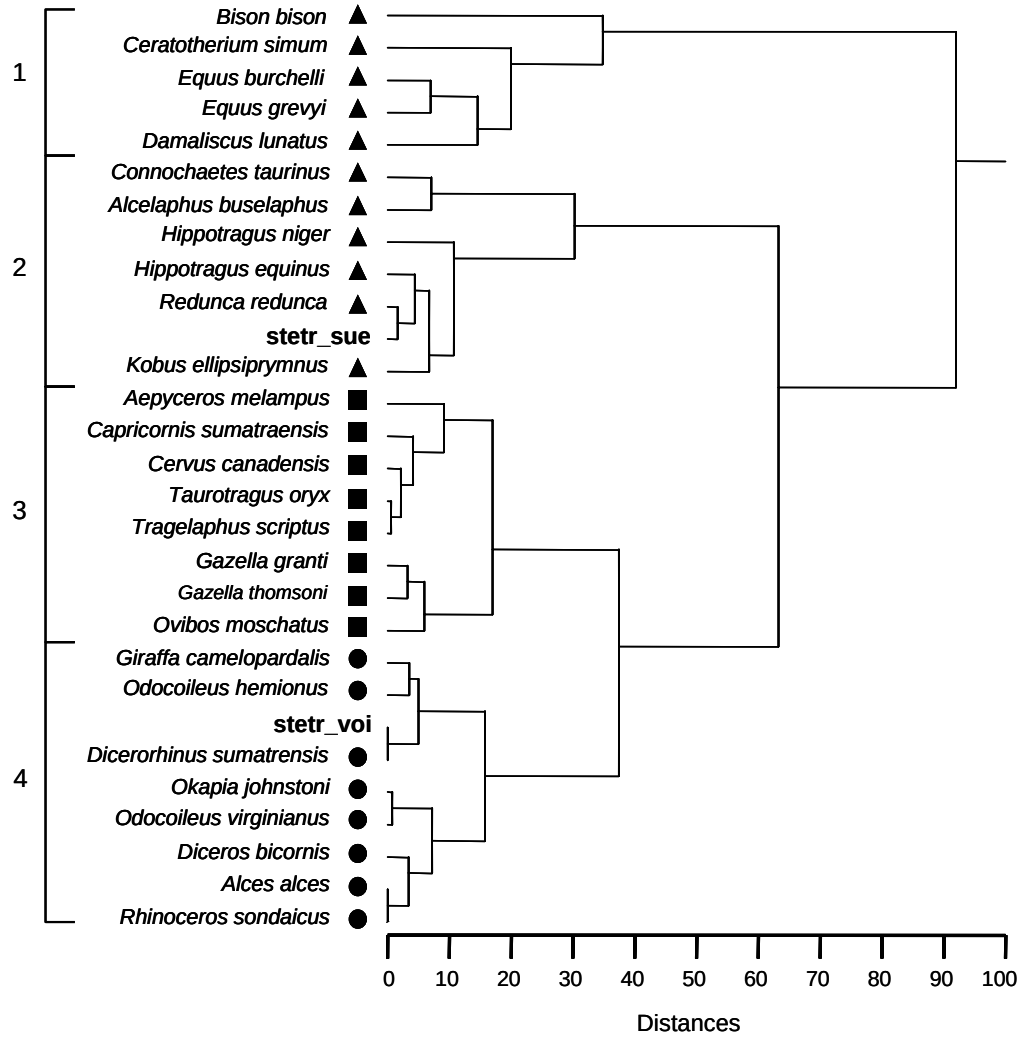

Fig. 1. Hierarchical cluster diagram based on a set of 27 "typical" extant species from FORTELIUS & SOLOUNIAS (2000). Triangle = grazers; square = mixed feeders; circle = browsers according to the conservative classification of FORTELIUS & SOLOUNIAS (2000); ED = Euclidean distance (root-mean-squared difference). Fossil populations of *Stephanorhinus etruscus*: stetr_voi = Voigtstedt population; stetr_sue = Süßenborn population.

In fact, we realize the two studied Central European populations of *Stephanorhinus etruscus* to display the most pronounced dietary variability ever been recorded by mesowear studies for a single herbivorous ungulate species. The feeding strategy ranged from a characteristic browsing regime at Voigtstedt to a moderate grazing regime at Süßenborn.

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ELBTAL-ELBGRUND (HESSEN; BUNDESREPUBLIK DEUTSCHLAND): EIN FOSSILREICHES MITTELTERTIÄRES SCHWARZPELIT-VORKOMMEN IM ÖSTLICHEN WESTERWALD

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Im Liegenden eines mächtigen Basaltes am Buschberg bei Elbtal-Elbgrund (BRD; Hessen; Kreis Limburg-Weilburg; östlicher Westerwald) wurde im Jahr 2000 ein fossilführender Schwarzpelit entdeckt. Das Landesamt für Denkmalpflege Hessen (Paläontologische Denkmalpflege) koordiniert hier verschiedene Forschungsprojekte auf der Grundlage einer im Jahr 2003 niedergebrachten Forschungsbohrung. Eine vorerst zusammengefasste lithologische Beschreibung der Bohrung erfolgte durch M. Felder. Noch in 2003 erfolgten geoelektrische Tomographiemessungen durch das Hessische Landesamt für Umwelt und Geologie (R. Blum). Eine absolute Datierung der hangenden Basalte wird durch D. F. Mertz (Univ. Mainz) vorbereitet.

Die lokale geologisch-tektonische Situation des Schwarzpelit-Vorkommens ist durch widrige Aufschlussverhältnisse ungenügend bekannt. Es ist Teil des basaltischen Tertiärs, das auf das liegende alttertiäre Westerwälder Tonlager folgt und mit diesem durch vulkanisch-intrusive wie auch tektonische Vorgänge verzahnt ist.

Bei den Grabungen wurden vorzüglich erhaltene Makro-Florenreste (Blätter, Früchte, Samen etc.) sowie Insektenreste geborgen. Diese Fossilien sind häufig; Hinweise auf fossile Vertebraten ergaben sich bislang nicht.

Erste Ergebnisse zur Palynofazies und Stratigraphie der Mikroflora (B. Nickel) zeichnen bereits ein wechselvolles Bild, das wertvolle erste Hinweise zur Auffassung der Fossillagerstätte gibt. Es beruht auf Kernproben der Forschungsbohrung (Profilabschnitt von 8,45 m bis 30 m Teufe; = Abfolge von Schwarzpeliten mit eingeschalteten feinklastischen Sedimenten und tuffitischen Lagen).

Bisher konnten 60 verschiedene Pollen- und Sporenformen aus Elbtal-Elbgrund nachgewiesen werden, die fast ausschließlich bekannte und meist häufige Formen