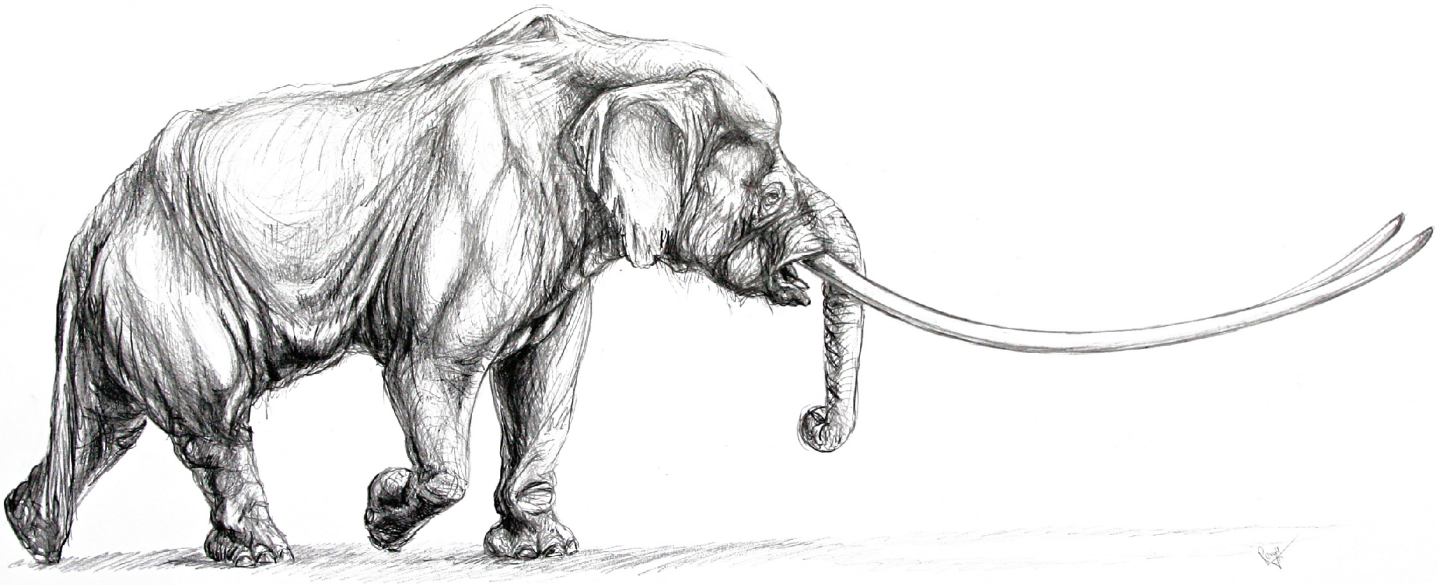
SCIENTIFIC ANNALS of the School of Geology,
Aristotle University of Thessaloniki

SPECIAL VOLUME 102



VIth International Conference on Mammoths and their Relatives

GREVENA
SIATISTA
GREECE 2014

ABSTRACT BOOK

Editors:
Dimitris S. KOSTOPOULOS, Evangelos VLACHOS, and Evangelia TSOUKALA

THESSALONIKI, MAY 2014

Scientific Annals, School of Geology, Aristotle University of Thessaloniki, Greece
VI[th] International Conference on Mammoths and their Relatives, Grevena - Siatista
Special Volume 102 173-174 Thessaloniki, 2014

Landscapes of the 'Yuka' Mammoth habitat: a paleobotanical approach

Natalia RUDAYA ✉, Albert PROTOPOPOV, Svetlana TROFIMOVA, Valery PLOTNIKOV, and Snezhana ZHILICH

In August 2010, a well-preserved woolly mammoth carcass was found along the Oyogos Yar coast (Fig. 1A,D) in the region of the Laptev Sea. The juvenile female mummy was nicknamed 'Yuka' after the name of the village of Yukagir, whose local people discovered it. The mammoth carcass was found hanging over a melting ledge in the upper third of a north-facing slope composed of loess sediments from the rich Late Pleistocene fossil-bearing Yedoma. By analysing the teeth and tusks, Yuka was determined to be approximately 6–8 years old when it died (Maschenko et al., 2012). The mammoth had most likely been attacked by lions or other predators. However, there were no indications that the predators had killed the mammoth. A 40-cm incision was found in the lumbar region and appears to have been made by a sharp implement. Most of the internal organs were missing. The skull, pelvis, ribs and several other bones had also been removed and were placed alongside the carcass. A fragment of Yuka's rib was AMS-dated to 34,300+260/-240 14C (GrA-53289), which corresponds to the termination of the MIS3. The onset, duration, and termination of the MIS3 Interstadial optimum based on paleoproxies vary in the Eastern Siberian Arctic in different records (see review in Wetterich et al., 2014), however, its limits can be identified as 44–32 kyr BP.

Two frozen sediment samples from the area of the skull condyles were collected for pollen and plant macrofossil analyses. This was the only place to obtain the samples, since the Yukagirs washed all the mammoth remains, including the gut, with water from a pump. Pollen sample was thawed, dried, and sieved through a 250-

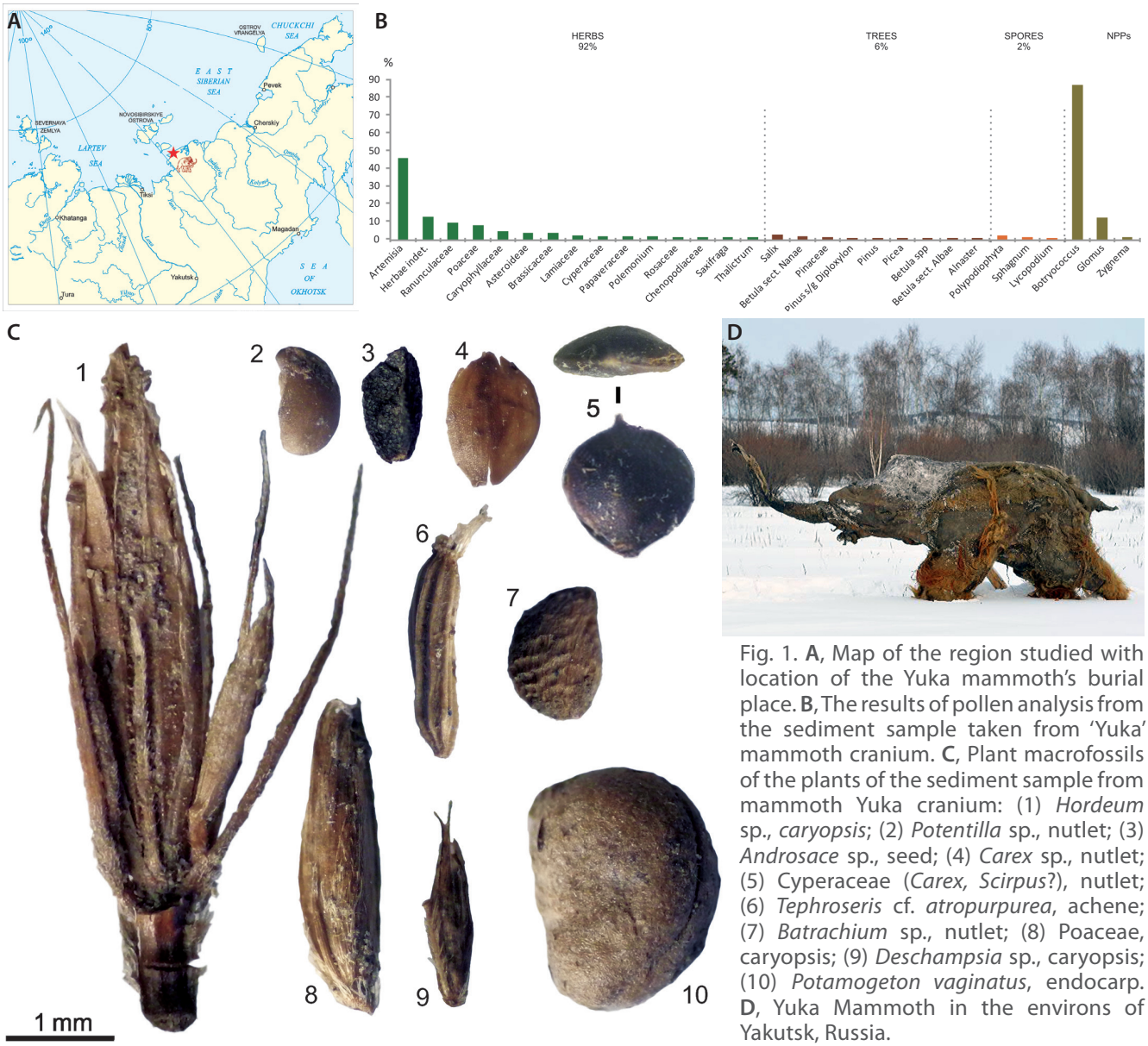


Fig. 1. **A**, Map of the region studied with location of the Yuka mammoth's burial place. **B**, The results of pollen analysis from the sediment sample taken from 'Yuka' mammoth cranium. **C**, Plant macrofossils of the plants of the sediment sample from mammoth Yuka cranium: (1) *Hordeum* sp., *caryopsis*; (2) *Potentilla* sp., nutlet; (3) *Androsace* sp., seed; (4) *Carex* sp., nutlet; (5) Cyperaceae (*Carex, Scirpus*?), nutlet; (6) *Tephroseris* cf. *atropurpurea*, achene; (7) *Batrachium* sp., nutlet; (8) Poaceae, caryopsis; (9) *Deschampsia* sp., caryopsis; (10) *Potamogeton vaginatus*, endocarp. **D**, Yuka Mammoth in the environs of Yakutsk, Russia.

μm mesh to remove coarse organic matter, which was later used for plant macrofossil analysis. The sample was treated using standard procedure (Faegri and Iversen, 1989). A total of 329 pollen grains and spores, which were taken as 100% for determining percentages of pollen taxa, were counted in the sample. The total number of palynomorphs, including the NPPs was 481. The total number of NPPs was taken as 100% when calculating the percentages of individual NPPs. The plant macrofossil sample was washed through a 250-μm mesh sieve and then air-dried. A total of 40 ml dry matter was examined and subjected to analysis using a Carl Zeiss Stemi 2000-C stereomicroscope.

In total, 25 taxa of pollen and spores were identified in the sample. Herbaceous taxa (92%) dominated the pollen spectrum with 6% of the pollen originating from trees (Fig. 1B). Among herbs, *Artemisia* pollen dominated (46%), together with indeterminable forb pollen (12.5%), and pollen from the Ranunculaceae, Poaceae, Caryophyllaceae, Asteraceae, and Brassicaceae. Plant macrofossils included 12 taxa (Fig. 1C). Seeds belonged to *Potamogeton vaginatus* (one endocarp); *Deschampsia* sp. (one caryopsis), *Hordeum* sp. (one caryopsis), Poaceae sp. (one caryopsis); *Carex* spp. (seven fragments of nutlets), Cyperaceae (*Carex, Scirpus*?) (one nutlet), *Potentilla* sp. (three nutlets); *Ranunculus* sp. (one fragment of nutlet), *Batrachium* sp. (one nutlet); *Androsace* sp. (one seed); Caryophyllaceae (one seed); *Tephroseris* cf. *atropurpurea* (one achene).

The vegetation of the MIS3 optimum became mosaic and the earlier-prevailing tundra-steppe was combined with willow shrubs or relatively mesophytic communities that were spread throughout protected and wet places (Andreev et al, 2011). Paleobotanical data obtained in this study represent two sets of taxa (macro- and microfossils); whereas macrofossils more reflect the local vegetation in the burial place of the Yuka mammoth, the pollen spectrum mainly reflects the regional vegetation. In general, macrofossil plant remains are characteristic of the herbaceous taxa that are widespread on the modern Yakutian tundra. However, seeds of *Potamogeton vaginatus* and *Batrachium* sp. as well as remnants of ostracod shells and ephippia of *Daphnia* reflect the existence of small freshwater ponds with stagnant or slowly moving water exactly at the site where the mammoth carcass was found. Except for aquatic and wet-site plants, the macrofossil spectrum includes steppe elements such as Caryophyllaceae and *Potentilla* sp. The type of vegetation, including these macrofossils, resembles the plant community that is relic today, and persisted in various parts of Metaberingia (Yurtzev, 2001). It is so called 'mesic-xeric meadows enriched with steppe elements' which are sometimes zoogenic and have a sparse canopy of shrubs. This conclusion is confirmed by pollen data. Despite the dominance in the pollen spectrum of *Artemisia*, the Ranunculaceae and Poaceae are highly abundant; the percentages of *Salix* and *Betula* sect. *Nanae* are also significant and are the most common arboreal taxa.

The pollen spectrum from the sample studied is generally typical of pollen spectra from the late Kargin records of the Eastern Siberian Arctic. Six leading taxa in the spectra are Artemisia, the Ranunculaceae, Poaceae, Caryophyllaceae, Asteraceae, and Brassicaceae. Five taxa (excluding Ranunculaceae) might characterise steppe-like vegetation and we suggest that it is a regional (zonal) feature. However, the percentage of *Artemisia* (46%) is significantly higher than in contemporary pollen records from North Yakutia (e.g., in Bol'shoy Lyakhovsky Island it is up to 4% (Wetterich et al., 2014) and Kurungnakh Island and Bykovsky Peninsula it is up to 10% (Andreev et al., 2011). The over-represention of *Artemisia* might be explained by the existence of disturbed soils close to the studied site, where wormwoods grew as weeds.

References

Andreev, A., Schirrmeister, L., Tarasov, P.E., Ganopolski, A., Brovkin, V., Siegert, C., Wetterich, S., Hubberten, H.-W., 2011. Vegetation and climate history in the Laptev Sea region (Arctic Siberia) during late Quaternary inferred from pollen records. Quaternary Science Reviews 30, 2182-2199.

Faegri, K. and Iversen, J., 1989. Textbook of Pollen Analysis. John Wiley & Sons, Chichester.

Maschenko, E., Potapova, O., Boeskorov, G., Agenbroad, L, 2012. Preliminary data on the new partial carcass of the Woolly mammoth, *Mammuthus primigenius*, from Yakutia, Russia. Abstracts of the 72th Annual SVR Meeting, 137.

Wetterich, S., Tumskoy, V., Rudaya, N., Andreev, A., Opel, Th., Meyer, H., Schirrmeister, L., Hüls, M., 2014. Ice Complex formation in arctic East Siberia during the MIS3 Interstadial. Quaternary Science Reviews 84, 39-55.

Yurtsev, B.A., 2001. The Pleistocene "Tundra-Steppe" and the productivity paradox: the landscape approach. Quaternary Science Reviews 20, 165-174.

nrudaya@gmail.com

Citation:
Rudaya, N., Protopopov, A., Trofimova, S., Plotnikov, V., Zhilich, S., 2014. Landscapes of the 'Yuka' Mammoth habitat: a paleobotanical approach. Abstract Book of the VIth International Conference on Mammoths and their Relatives. S.A.S.G., Special Volume 102: 173-174.