ABSTRACT BOOK

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fluorescence was observed in the apertures. The germination experiments have shown that pollen tubes are always formed in apertural areas. The intine thickenings in the interapertural areas is not typical for sporoderm structure of angiosperms and was previously interpreted as sites of pollen tube formation in *Vinca* pollen (Cousin, 1979). Our studies shows that the sites of the pollen tubes formation are marked by β-glucans, associated with the inner intine layer of the apertures. The intine thickenings of the interapertural areas are probably connected with the transfer of protective function from a thin exine to the outer pectinous intine layers.

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Intine development of posttetrade sporoderm in *Aristolochia clematitis* (Aristolochiaceae)

POSTER IN SESSION S8

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Aristolochia clematitis pollen grains are usually considered as inaperturate. However their sporoderm ultrastructure and especially the development have not been investigated. *Aristolochia clematitis* flower buds of different sizes were collected in the MGU Botanical Garden in May 2011 and 2012. The material was fixed in 2.5% glutaraldehyde buffered with 0.1 M cacodylate buffer with or without addition of tannin. Then the mateial was rinsed in cacodylate buffer, postfixed with 2% OsO_4 for 2 h. After ethanol rinses, the specimens were placed in uranyl acetate, dehydrated through an ethanol and acetone series. The specimens were then infiltrated with epon resin, embedded overnight at room temperature, and polymerized at 62°C for two days. Ultrathin sections were post-stained with aqueous uranyl acetate and lead citrate. TEM pictures were taken in the Laboratory of electron microscopy at the Biological faculty of Lomonosov Moscow State University, using an electron microscope JEM-1011 (Jeol, Japan) at 80 kV and Gatan Erlangshen-500 SW digital camera with Digital Micrograph Gatan software. *Aristolochia clematitis* pollen grains are spheroidal, the exine is micro-reticulate. During successive microsporogenesis mother cells are divided to form all the tetrad types except for the tetrahedral one. The prevalent tetrad type is the tetragonal one. At the tetrade stage, the primexine matrix develops in the periplasm. Then the procolumellae and protectum are formed. At the end of the tetrad stage the ectexine consists of the tectum and columellae, and the lamellar endexine starts to form. At the free microspore stage, the endexine appears homogeneous, compact and becomes thinner. At this stage the intine appears and thickens by means of the intensive exocytosis. The thickness of the tubular intine increases and appears twice in comparison with the exine. The thickness and structure of the young sporoderm are the same all over the microspores wall. Then the inner homogeneous electron-transparent zone of the intine is formed. The mature intine is bilayered and retains remnants of tubular structure in the outer layer. In aperture regions the ectexine is represented by separate granules, the endexine is interrupted only in the center of the aperture, opening the intine. Both intine layers are uniformly thickened in the aperture regions.

Reaction of woodland communities on settlement and climatic changes between AD 1250 and 2000 in northeastern Poland. Combined pollen, varve chronology and historical data

POSTER IN SESSION S30

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The pollen data from annually laminated (varved) sediments of Lake Żabińskie provides a 6–years resolution reconstruction of vegetation and land-use changes for the Mazurian Lake District area. The investigations focus on the period from the end of tribal Prussia (13th century AD) until the present. Varve chronology allows for precise correlation of historical data related to human economy, settlement and climatic events, with the transformation

of plant communities demonstrated in the pollen record. Selected aspects of the research are: (1) character and chronology of woodland transformation attributed to the Teutonic Order colonization; (2) origin of a large scale woodland clearing; (3) the reconstruction of vegetation changes in the Modern period and (4) demonstration of which historical and climate events influenced plant communities. The Crusade against the Prussian tribes in the 13th century, the Christianization and incorporation of the Prussian territory into the monastic state resulted in economic, demographic and ethnical changes, and introduction of woodland management. A strong impact of these historical events on the natural environment is confirmed by both written sources and selected palaeobotanical data. According to the earlier palaeoecological studies, some sites in the Great Mazurian Lake District area were strongly deforested before the Holy War (such as Lakes Miłkowskie and Wojnowo) and other were cleared in the Teutonic Order time (Lake Łazduny). Lake Żabińskie represents a third group of sites at which a similar development took place in the Modern period (c. AD 1600). The settlement history of Prussia is rich in periods of economic booms and recessions, and provides an excellent opportunity for studies of the effects on the environment of short-term historically documented natural and anthropogenic changes. Our results confirm that several of these historical events are clearly recorded in the pollen record. The presented results are part of an ongoing interdisciplinary project, CLIMPOL, that aims at establishing a quantitative reconstruction of temperature changes in northern Poland during the last 1000 years. Precise chronology was established, and high-resolution botanical, isotopic and geochemical proxy analysis were performed. A modern training set with data from 50 lakes, long-term instrumental data and validation with documentary sources are used for calibration of the proxy data using advanced statistical methods.

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Cenozoic environment changes and the development of arid vegetations in Northwest China

TALK IN SESSION S26

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Although Northwest China has been always in the control of arid climate since the middle Cretaceous, some relatively humid and relatively more drought stages are still recognizable in the Cenozoic, which are closely associated with environment changes. Changes in vegetation types contain significant temperature and precipitation signals, inferring the possible seasonal climate differences. This paper traces the development of Cenozoic environment and vegetation, leading to the present aridity. At the beginning of the Tertiary (the Paleocene and the early-middle Eocene), the Tethys didn't retreat from Central Asia and South Asia. Under the influence of the ocean, the climate was more or less moist. Floras developed into forest blocks and shrubs. Although the *Ephedra* shrubs distributed over a wide area, some forest blocks formed by Fagaceae, Meliaceae and Nyssaceae, etc. developed nearby rivers and waters. In the middle-late Eocene, with the collision of India plate and Eurasian plate, the Tethys exited from South and Central Asia, and some mountains such as Gangdise and Kunlun uplifted, resulting in the formation of conifer forests which are well recognized in the palynological assemblage at the bottom of the Ganchaigou Formation in Qaidam Basin. With much weakened marine influence, the Northwest China, including Junggar Basin, Turpan - Hami area and Tarim Basin in Xinjiang, Qaidam and Xining-Minhe Basins in Qinghai, and Linxia and Ningxia areas in Gansu, etc., became relatively more dry in the late Eocene–early Oligocene. The floras mainly developed into *Ephedra* and *Nitraria* based mass shrubs. By the late Oligocene–early Miocene, it is possibly due to the relatively lowered altitude as a result of the erosion in the southern mountains, that this area was partly affected by the sea breeze or southwest monsoon, and developed with sparse tree steppe or forest steppe in the east showing a slight increasing of woody angiosperms. Since the middle Miocene, some plots of the land in the Qinghai-Tibet Plateau had gradually reached to a considerable height, and consequently destroyed the original planetary wind