



NECLIME working group on taxonomy of the Neogene macrobotanical record

Workshop, Budapest, Hungary, May 24, 2011

Report

(Boglárka Erdei, Torsten Utescher)

Summary of the discussion

Main topics discussed:

- where are we now: a summary of the NLR (Nearest Living Relative) concepts and their implications on palaeoclimate and vegetation reconstruction was given by Torsten Utescher. Torsten also informed us about the latest entries and updates of macro- and microtaxa (more than 200 since the pre-meeting in Frankfurt) for the NECLIME database. For microtaxa you can find a downloadable table at the NECLIME website (<http://www.neclime.de/>, go to groups, taxonomy of Neogene palynomorphs, for macrotaxa see table below). Participants discussed that a general age limit for the use of species as NLRs makes no sense, however in angiosperms reliable identification of NLR species is expected from Eocene / Oligocene boundary on.
- taxon complexes in the Cenozoic plant record: Zlatko Kvaček presented the novelties in the taxonomy of European Cenozoic plants. The importance of integrative studies on macro remains and pollen was further emphasized with some examples. Taxon complexes considered so far are listed in the table below (cf. green panels)

In order to facilitate communication of the macro- and microtaxonomy working groups the participants suggested organize a joint workshop for the next year.

- NECLIME database

Additional NLR updates were made and some conflicting NLR interpretations were improved by the kind assistance of Zlatko Kvaček. The NLR concept we developed for



selected taxa is given in the table below, including references and remarks. The online version of the NECLIME data base will be updated accordingly.

Comparison at Subgenus / Section level in pre-Miocene floras was considered as a good compromise if allocation of NLRs is not quite clear-cut.

Participants discussed that *Quercus* has a wide pft (plant functional type) spectrum and ecological range which has to be considered when interpreting results.

Participants agreed that the potential of molecular phylogenetic approaches in the designation of NLRs is definitely supported by existing or ongoing studies (e.g. Meliaceae, Salicaceae (Müllner et al.); Vitaceae (Popova et al.); angiosperms in general (Y. Xing et al.)).

Participants suggested involve Alexandra Müllner, Yaowu Xing, Frederic Jaques (?), Dieter Uhl, Vasilis Teodoridis, Elzbieta and Grzegorz Worobiec...

Yaowu Xing's talk was focused on the Neogene vegetation of Yunnan Province. He also presented us the summary of the research programme he is involved (H.P. Linder (UZH Zürich), Cenozoic Angiosperm Radiations: the role of climate change).

- plant functional type classification

Louis François discussed the current status of the new plant functional type classification which is developed in the CARAIB dynamic vegetation model for the study of Neogene vegetation cover. Louis mentioned that pfts depend on soil water in the model while from the proxy data precipitation is estimated. To solve this problem it is proposed to use index, e.g. MAP / potential evapotranspiration to obtain a parameter that is more relevant for water stress and more comparable to the soil water variable in CARAIB.

Participants:

Boglárka Erdei

Louis Francois

Lilla Hably

Zlatko Kvaček

Júlia Tamás

Torsten Utescher

Yaowu Xing



fossil species	taxon complex	Nearest Living Relative(s)	family	reference for NLR interpretation, remarks
<i>Acer gerberi</i>		<i>Acer palmatum</i> , <i>pseudosieboldianum</i>	A/Aceraceae	Teodoridis et al., 2009
<i>Acer campestrianum</i>		<i>Acer Sectio Campestris</i>	A/Aceraceae	Teodoridis et al., 2009
<i>Acer integerrimum</i>		<i>Acer Sectio Acer</i> (<i>pseudoplatanus</i> , <i>heldreichii</i> , <i>monspesulana</i> , etc.)	A/Aceraceae	Ströbitzer-Hermann, 2002: <i>Sectio Platanoidea</i> , esp. <i>A. truncatum</i> ; Teodoridis et al., 2009: <i>A. mono</i> , <i>pictum</i> , <i>cappadocicum</i> ; Barron 2010: <i>A. pictum</i> , <i>cappadocicum</i> ; Kvacek, pers. comm. 2011: <i>Sectio Acer</i>
<i>Acer angustilobum</i>		<i>Acer Sectio Spicata</i>	A/Aceraceae	Ströbitzer-Hermann, 2002: anatomical: <i>A. heldreichii</i> ; morphological: <i>A. pseudoplatanus</i> ; Walther and Kvacek, 2007: <i>Sectio Spicata</i>
<i>Actinidia faveolata</i>		<i>Actinidia</i> sp.	A/Actinidiaceae	Mai, 2001: also <i>Clematoclethra</i> , <i>Emmenanthe</i> possible; Teodoridis et al., 2009: <i>A. melanandra</i> , <i>arguta</i>
<i>Alangium deutschmanii</i>		<i>Alangium</i> sp.	A/Alangiaceae	Martinetto, 2005: <i>A. lingifolium</i> Merr.; Teodoridis et al., 2009: <i>A. longiflorum</i> , <i>lamarcki</i>
<i>Asimina brownii</i>		<i>Asimina triloba</i>	A/Annonaceae	van der Burgh, 1986: <i>A. triloba</i> ; Teodoridis et al., 2009: <i>A. triloba</i> , <i>parviflora</i> ; Kvacek, pers. comm. 2011: <i>A. triloba</i>
<i>Aralia szaferi</i>		<i>Aralia</i> sp.	A/Araliaceae	Teodoridis et al., 2009: <i>A. californica</i>
<i>Mahonia staphyleaeformis</i>		<i>Mahonia</i> sp.	A/Berberidaceae	Teodoridis et al., 2009: <i>M. fremontii</i> , <i>aquifolium</i>
<i>Alnus julianiformis</i> <i>A. gracilis</i> complex	<i>Alnus julianiformis</i> <i>A. gracilis</i>	<i>Alnus trabeculosa</i> , <i>Alnus japonica</i>	A/Betuaceae	Kvacek, pers. comm., 2011
<i>Alnus gaudinii</i> <i>A. kefersteinii</i> complex	<i>Alnus gaudinii</i> <i>A. kefersteinii</i> <i>Alnipollenites verus</i>	<i>Alnus Sectio Clethropsis</i> (<i>A. maritima</i> , <i>nepalensis</i> , <i>nitida</i>)	A/Betulaceae	Daskova, 2008; Kvacek, pers. comm., 2011
<i>Alnus ducalis</i>		<i>Alnus Sectio Clethropsis</i> (<i>A. maritima</i> , <i>nepalensis</i> , <i>nitida</i>)	A/Betulaceae	Kovar-Eder, 1996: <i>Alnus matsumurae</i> ; <i>Palaeoflora: Sectio Clethropsis</i>
<i>Alnus menzelii</i>		<i>Alnus serrulata</i>	A/Betulaceae	Worobiec and Szykiewicz, 2007: <i>A. subcordata</i> ; <i>S. serrulata</i> (closer related)
<i>Betula plioplaptera</i>		<i>Betula</i> sp.	A/Betulaceae	Worobiec and Szykiewicz, 2007: <i>'B. papyrifera, nigra, platiphyllo</i>
<i>Sambucus lucida</i>		<i>Sambucus</i> sp.	A/Caprifoliaceae	Mai and Walther, 1991: list with reference taxa; Teodoridis et al., 2009: <i>S. chinensis</i> , <i>williamsii</i> , <i>glauca</i> , <i>pubens</i>
<i>Sambucus pulchella</i>		<i>Sambucus</i> sp.	A/Caprifoliaceae	Mai 2001: close to <i>S. williamsii</i> , <i>caerulea</i> , <i>glauca</i>); Teodoridis et al., 2009: <i>S. ebulus</i>
<i>Cercidiphyllum crenatum</i> complex	<i>C. crenatum</i> ; <i>C. helveticum</i> ; <i>Cercidiphyllon kanadense</i> ; <i>Cercidiphyllites microreticulatus</i>	<i>Cercidiphyllum japonicum</i> (monotyp)	A/Cercidiphyllaceae	Kvacek, pers. comm. 2011



Swida gorbunovii		Cornaceae	A/Cornaceae	Arbuzova, 1997: Cornaceae; Teodoridis et al., 2009: C. alba, serica
Trichosanthes fragilis		Trichosanthes sp.	A/Cucurbitaceae	Teodoridis et al., 2009: T. palmata, kirlowii
Fagus silesiaca		Fagus hayatae	A/Fagaceae	Denk, pers. comm: F. grandifolia, longipetiolata; 'Worobiec 2003: F. hayatae
Fagus attenuata		Fagus hayatae	A/Fagaceae	Worobiec, 2003: F. hayatae (most probably syn. of F. silesiaca)
Fagus kräuselii		Fagus orientalis	A/Fagaceae	Belz 1992: Fagus sp.; Teodoridis et al., 2009: F. sylvatica ssp. orientalis (?), Kvacek 2011: F. orientalis, not sylvatica
Fagus saxonica		Fagus sp.	A/Fagaceae	Palamarev and Mai, 1998: F. longipetiolata, grandifolia, lucida; Kvacek, pers. comm. 2011: Fagus sp.
Fagus deucalionis		Fagus sp.	A/Fagaceae	Mai and Walther, 1991; F.gran.syl.gren.; Palamarev and Mai 1998; F. grandifolia; Teodoridis et al., 2009: F. sieboldii, grandifolia; Kvacek 2011., pers. comm. Fagus
Quercus kubinyi		Quercus Sectio Cerris	A/Fagaceae	Teodoridis et al., 2009: Q. variabilis ?; Kvacek, pers. comm. 2011: Sectio Cerris
Quercus drymeja		Quercus Sectio Cerris	A/Fagaceae	Bozukov, pers. comm., 2006, Quercus acutissima; lancifolia, xalapensis; Kvacek, pers. comm. 2011: Q. Sectio Cerris
Trigonobalanopsis exacantha complex	T. exacantha, T. rhamnoides; Castaneoideaepo llis pusillus	Trigonobalanus sp.	A/Fagaceae	Kvacek, pers. comm. 2011
Proserpinaca reticulata		Proserpinaca sp.	A/Gunneraceae	Mai, 2000: close to P. pectinata; Teodoridis et al., 2009: P. palustris, intermedia
Corylopsis urselensis		Corylopsis sp.	A/Hamamelidaceae	van der Burgh, 1988: C. pauciflora; Teodoridis et al., 2009: C. spicata, willmottiae; Kvacek, pers. comm. 2011: Hamamelioideae
Distylium huardii		Distylium sp.	A/Hamamelidaceae	Kvacek, Teodoridis, Roiron, 2011
Liquidambar europaea		Liquidambar styraciflua, Liquidambar orientalis	A/Hamamelidaceae	Belz and Mosbrugger, 1992: L. styraciflua; Teodoridis et al., 2009: L. styraciflua, orientalis, acalycina
Aesculus spinosissima		Aesculus hippocastanum	A/Hippocastanaceae	Teodoridis et al., 2009
Carya angulata		Carya sp.	A/Juglandaceae	Kramer, 1974: C. cordiformis, glabra; Teodoridis et al., 2009: C. ovata; Kvacek, pers. comm. 2011: Carya sp.
Engelhardia orsbergensis		Engelhardia sp., Oreomunnea sp.	A/Juglandaceae	Butzmann et al., 2009: E. roxburghiana, Oreomunnea mexicana; Kvacek, pers. comm. 2011: Engelhardia sp. Oreomunnea complex



Pterocarya paradisiaca		Pterocarya fraxinifolia	A/Juglandaceae	Eder-Kovar, 1988: P. paradisiaca; Bozukov, 2008, Teodoridis et al., 2009: P. pterocarpa; Kvacek, pers. comm. 2011: P. fraxinif.
Pterocarya limburgensis		Pterocarya fraxinifolia	A/Juglandaceae	Gregor, 1978: list of reference taxa; Teodoridis et al., 2009: P. fraxinifolia, rhoifolia, Kvacek pers com 2011: Pterocarya fraxinifolia
Ajuga antiqua		Ajuga reptans	A/Lamiaceae	van der Burgh, 1986: A. reptans; Teodoridis et al. A. reptans, genevensis
Parrotia pristina		Parrotia persica	A/Hamamelidaceae	Kovar-Eder, 1988: more probable: Fothergilla; Shaniodendron (Nemejc et al., 2002); Bozukov, 2008, Teodoridis et al., 2009, Kvacek, pers. comm. 2011: P. persica, not Fothergilla
Laurophyllum kinkelinii		Persea sp.	A/Lauraceae	Kvacek, 2004: var. glabrum similar to Ocotea; Kvacek pers. comm. 2011: Persea sp.
Laurophyllum pseudoprinceps		Ocotea, Nectandra	A/Lauraceae	Knobloch et al., 1996: similar to Ocotea, Nectandra; Kvacek, 2004: most likely Ocotea; Kvacek 2011: Ocotea, Nectandra
Ficus multinervis		Decodon verticillata (monotyp)	A/Lythraceae	syn Apocynophyllum helveticum cf. Kvacek and Sakala, 1999
Decodon gibbosus complex	Decodon gibbosus, Ficus multinervis (Syn. A. helveticum)	Decodon verticillata (monotyp)	A/Lythraceae	Kvacek, pers. comm. 2011
Magnolia cor		Magnolia sp.	A/Magnoliaceae	Teodoridis et al., 2009: M. stellata, salicifolia, liliiflora
Liriodendron geminatum		Liriodendron chinensis	A/Magnoliaceae	Palamarev and Petkova: L.tulipifera; Teodoridis et al., 2009, Kvacek, pers. comm 2011: L. chinensis
Byttneriopsis daphnogenes		Malvaceae	A/Malvaceae	Kvacek, Wilde, 2010: 'extinct genus of Malvaceae s.l.
Saportaspermum kovacsiae	Byttneriopsis div. sp.	Malvaceae	A/Malvaceae	Kvacek, Wilde, 2010: 'extinct genus of Malvaceae s.l.
Byttneriopsis steuerii		Malvaceae	A/Malvaceae	Kvacek, Wilde, 2010: 'extinct genus of Malvaceae s.l.
Byttneriopsis spiegelii		Malvaceae	A/Malvaceae	Kvacek, Wilde, 2010: 'extinct genus of Malvaceae s.l.
Banisteriaecarpum giganteum Byttneriophyllum tiliaefolium complex	Banisteriaecarpum giganteum Byttneriophyllum tiliaefolium, l. instructus vel insculptus?	Tilioideae	A/Malvaceae	Kvacek, pers. comm. 2011
Nyssa bilinica complex	Nyssa, bilinica (forma haidingeri, forma bilinica), Nyssa ornithobroma, Nyssapollenites kruschii	Nyssa sp.	A/Nyssaceae	Kvacek, pers. comm. 2011
Olea oleastroides		Olea sp.	A/Oleaceae	Teodoridis et al., 2009: O. europaea



Platanoxylon bohemicum	Platanus neptuni, Platanipollis ipelensis	Platanus sp.	A/Platanaceae	Kvacek, pers. comm. 2011
Platanus neptuni complex	Platanus neptuni; Platanoxylon bohemicum; Platanipollis ipelensis	Platanus sp.	A/Platanaceae	Kvacek, pers. comm., 2011
Prunus crassa		Prunus sp.	A/Rosaceae	Teodoridis et al., 2009: P. napaulensis, bracteopadus
Prunus girardii		Prunus sp.	A/Rosaceae	Teodoridis et al., 2009: P. allegghanensis, watsonii; Kvacek pers. comm. 2011: Prunus sp.
Pyracantha acuticarpa		Pyracantha sp.	A/Rosaceae	Teodoridis et al., 2009: P. coccinea, grenulata, gibbsii; Kvacek, pers. comm. 2011: Pyracantha sp.
Phellodendron elegans		Phellodendron sp.	A/Rutaceae	Teodoridis et al., 2009: P. japonicum
Meliosma wetteraviensis		Meliosma veitchiorum	A/Sabiaceae	Köhler, 1994: M. veitchiorum; Teodoridis et al., 2009: M. veitchiorum, alba
Sabia europaea		Sabia sp.	A/Sabiaceae	Gregor, 1987: list with reference taxa; Teodoridis et al., 2009: S. leptandra, limonica, japonica
Populus populina		Populus Sectio Leucoides	A/Salicaceae	Nemejc et al., 2002: partly P. deltooides, angulata, partly Sectio Leuc.; Teodoridis et al., 2009: P. Sect. Leucoides
Salix lavateri		Salix sp.	A/Salicaceae	Palamarev and Petkova: S. nigra, interior; Barron 2010: S. nigra, caroliniana
Staphylea pliocenica		Staphylea sp.	A/Staphyleaceae	Teodoridis et al., 2009: S. pinnata
Reevesia hurnikii Kvacek complex	Reevesia hurnikii, Laria rueminiana, Reevesiapollis	Reevesia sp.	A/Sterculiaceae	Kvacek, pers. comm, 2011
Laria rueminiana	Reevesia hurnikii, Laria rueminiana, Reevesiapollis	Reevesia sp.	A/Sterculiaceae	Kvacek, pers. comm, 2011
Reevesia hurnikii	Reevesia hurnikii, Laria rueminiana, Reevesiapollis	Reevesia sp.	A/Sterculiaceae	Kvacek, pers. comm, 2011
Styrax burdigalensis	Styrax maximus (F)	Styrax sp.	A/Styracaceae	Kvacek, Teodoridis, Roiron, 2011
Styrax maximus	Styrax burdigalensis (B)	Styrax sp.	A/Styracaceae	Mai, 1964; Teodoridis et al., 2009: S. japonicus
Symplocos casparyi		Symplocos sp.	A/Symplocaceae	Teodoridis et al., 2009: Symplocos subgen. Hopea; Wang et al., 2004: uncertainties in definition of subgenus
Stewartia beckeriana		Stewartia sp.	A/Theaceae	Mai, 2000: close to S. monadelpha; Teodoridis et al., 2009: S. monadelpha, serrata
Craigia bronni complex	Dombeyopsis lobata, Intratriporopolleni tes instructus type	Craigia sp.	A/Tiliaceae	Kvacek, pers. comm. 2011



Dombeyopsis lobata	Craigia bronni, Intratriporopollenites instructus type	Craigia sp.	A/Tiliaceae	Malvaceae: Kvacek and Wilde, 2010; Kvacek, 2004: Craigia sp.; Teodoridis et al., 2009: C. yunnanensis
Ulmus carpinooides (Sarmatian and younger)		Ulmus carpinifolia	A/Ulmaceae	Mai, 1995: European Ulmus; Bozukov, pers. Comm.: U. laevis; Teodoridis et al., 2009; Kvacek, pers. comm. 2011. U. carpinifolia
Zelkova zelkovaefolia		Zelkova sp.	A/Ulmaceae	Palamarev and Petkova; Z. cretica; Erdei and Bruch, 2004: Zelkova sp.; Teodoridis et al., 2009: Z. sicuta, abeliacea, carpinifolia
Ulmus pyramidalis		Ulmus Sectio Chaetoptelea (U. alata, mexicana)	A/Ulmaceae	Palamarev and Petkova: U. americana U. alata; Teodoridis et al., 2009; Kvacek, pers. comm. 2011: Ulmus Sect. Chaetoptelea
Ampelopsis tertiaria		Ampelopsis megalophylla	A/Vitaceae	MacGinitie 1974: unc. sedis; Teodorides et al., 2009: A. megalophylla, fargesii, brevipedunculata; Kvacek, pers. comm. 2011: A. megalophylla
Vitis ludwigii		Vitis sp.	A/Vitaceae	Teodoridis et al., 2009: V. munsoniana, watsoniana
Vitis teutonica		Vitis sp.	A/Vitaceae	Mai and Walther, 1991: E As species; Teodoridis et al., 2009. V. balansana
Vitis parasylvestris		Vitis sylvestris	A/Vitaceae	van der Burgh, 1986: V. sylvestris; Teodoridis et al., 2009: Vitis coignetiae
Taxodium dubium complex	Taxodium dubium, Taxodioxylon taxodii, Inaperturopollenites hiatus	Taxodium sp.	G/Cupressaceae	Kvacek, pers. comm. 2011
Picea latisquamosa		Picea sp.	G/Pinaceae	Teodoridis et al., 2009: P. excelsa, morinda; Kvacek pers. comm. 2011: not P. excelsa
Pinus brevis		Pinus Sectio Pinus	G/Pinaceae	Mai, 1986: Pinus mugo; Teodoridis et al., 2009: Pinus sp.
Pinus strozzi	Pinus timleri (F), Kallithea (F)	Pinus (sula group, P. canariense, P. roxburghii)	G/Pinaceae	Kvacek, pers. comm. 2011
Carex flagellata		Carex sp.	M/Cyperaceae	Palamarev and Petkova, Teodoridis et al., 2009; C. dickinsii, C. rostrata
Scirpus pliocenicus		Scirpus sp.	M/Cyperaceae	Teodoridis et al., 2009: S. carinatus
Sparganium noduliferum		Sparganium sp.	M/Sparganiaceae	Teodoridis et al., 2009: S. simplex
Juglans acuminata		Dicots.	?	Belz and Mosbrugger, 1992: J. rupestris; Walther, 1999: Cedrela sl. (Cedrela/Toona); (Knobloch et al., 1996: Eotrigonobalanus); Kvacek pers. comm. 2011: enigmatic