6th workshop of the NECLIME working group on taxonomy of the Neogene palynomorphs

Report

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The 6th workshop of the NECLIME working group on taxonomy of the Neogene palynomorphs, was held in Warsaw, at the Polish Geological Institute, and was kindly hosted by Barbara Slodkowska. 12 colleagues attended the workshop. The program included 9 talks presented on the first day, and 2 talks as well as extensive discussions and microscope works during the second day. As usual, the participants exchanged research results and discussed specific ta**x**onomical questions, including also examinations under the microscope. The participants were guided through the PGI museum collection and the current exhibition on Neogene brown coal. Moreover, the SHRIPM (Sensitive High Resolution Ion MicroProbe) device of the PGI was introduced to the participants in the frame of a small workshop. The evening programme included a visit of the city of Warsaw guided by an historian. Abstract book and meeting report are available for download at the NECLIME website.

We thank Barbara Slodkowska and colleagues for all the effort they put in the preparations to make this a wonderful and most productive event.

Core topics presented on the workshop were focused on several topics

1. The application of TLM/SEM on fossil pollen flora as a specific focus. A lot of work was done here by our colleagues on North Sea, Central and Eastern Paratethys materials.
2. The Central European pollen record – taxonomy, palaeoecology. Possibilities for correlation with the Eastern Paratethys and Mediterranean.
3. The brown coal sections in Poland as a model for vegetation dynamics in the Cenozoic and possible high resolving palynological studies including analyses of short-term climate and vegetation dynamics.
4. The Polish Atlas of Neogene Palynomorhs – what´s next?
5. Non-pollen palynomorphs in Neogene sediments.

Points addressed in the discussion

1)

The application of the combined TLM/SEM technique on the fossil pollen flora of Europe and West Asia opens up a new perspective bringing about refined NLR concepts that are also relevant for colleagues working on macroflora. In this context it is suggested to organize another joint meeting of the macro- and micro-groups of NECLIME. Moreover it is appointed to compile a list with published photographic documentations of pollen taxa to be placed on the webpage of the working group [all working group members].

2)

Possible correlations of the Central European Neogene palynomorph record with the Eastern Mediterranean were discussed in detail, based on materials recovered from Messinian strata of the Central Anatolian Plateau [Müge Atalar, Marianna Kovačová].

3)

Polish brown coal sections, available pollen records and the climate evolution inferred from the study of these comprehensive terrestrial archived were discussed in very detail. Joint studies are appointed in order to compare Neogene climate and vegetation evolution observed in these records with coeval data from NW Germany and the Eastern North Sea Basin [Barbara Slodkowska and Torsten Utescher will coordinate the study].

4)

Barbara Slodkowska and Maria Ziembinska-Tworzydlo, co-authoring the famous atlas of Polish Neogene pollen and spores (Stuchlik ed.) presented the notorious „Ghost" atlas of the Polish Neogene Pollen and spores. The "Ghost Atlas" represents a hoard of Neogene biodiversity and comprises 5 volumes with unpublished materials from the Polish Neogene, conifers, spores, angiosperms 1+2, and other palynomorphs. The index of contents of the "Ghost Atlas" is made available on demand to be viewed in the Warsaw Museum of the Earth, Polish Academy of Sciences. Contact e-mail: sekretariat@mz.pan.pl and dr Aleksandra Kohlman-Adamska (responsible person).

In the future, lists of specimens in the family system will be available on the website of the Museum of the Earth. Scanned copies of selected parts of the collection can be provided after contact with the responsible person at the Museum of the Earth, Warsaw, and thus will be made available for the scientific community.

Other topics

- NECLIME website

A brief introduction to the Atlas of Pollen and Spores of the Polish Neogene as a standard resource for palynological research in the European Neogene will be published on the NECLIME webpages [Andrea Kern].

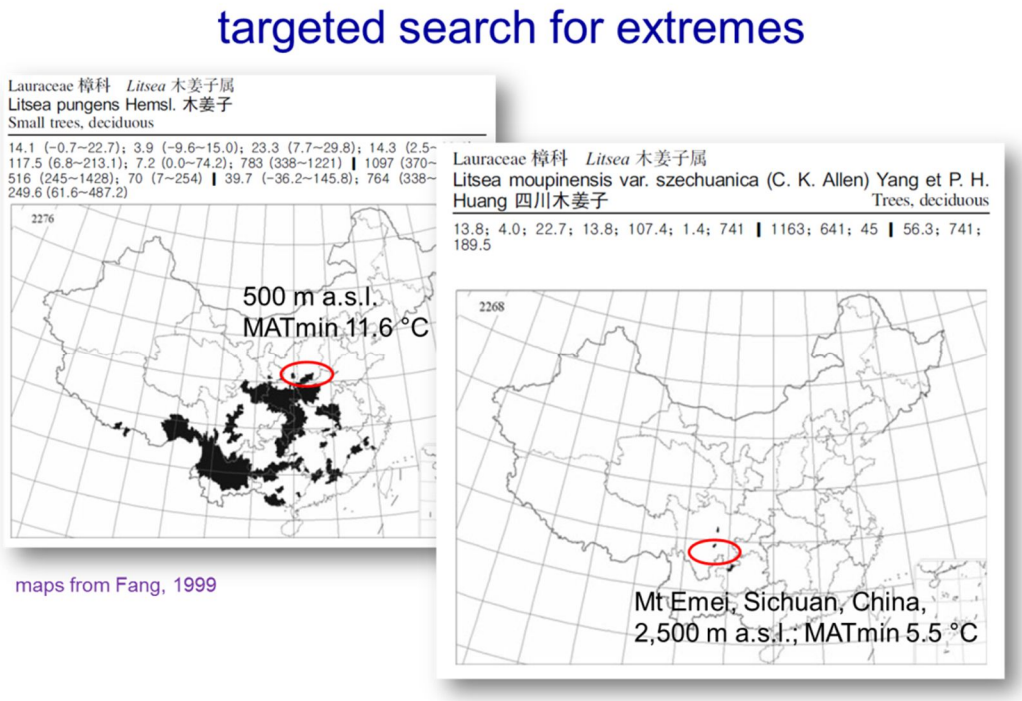
- Palaeoflora Database

In their contribution to the 5th special issue of NECLIME, Martinetto et al. provide MATmin data for a total of 68 genera, all of them considered NLRs of the European plant fossil record (see also point on HUTEA/CTEA taxa below). All related entries contained in the Palaeoflora Database have been checked in the meantime, and will be made available online (www.palaeoflora.de; query for climate data). It was stated that the NLR concept for *Edmundipollis* cited in the database needs updating (cf. table below for corrected entries). You can assess NLRs for *Edmundipollis* online when searching for micro taxa. Palaeoflora now has data sets for both, deciduous and evergreen *Symplocos*.

Fossil taxon	NLRs	last update
Edmundipollis edmundi (Potonié) Konzalová, Słodkowska and Ziembinska-Tworzydlo	*Diplopanax sp.*	10/14
Edmundipollis grossularius (Potonié) Słodkowska and Ziembinska-Tworzydlo	*Schefflera sp.*	11/15
Edmundipollis mastixioides Słodkowska and Ziembinska-Tworzydlo	*Mastixia sp.*	10/14
Edmundipollis megagranatus (Mamczar) Słodkowska and Ziembinska-Tworzydlo	*Aralia sp.*	11/15
Edmundipollis vitiosus (Mamczar) Słodkowska and Ziembinska-Tworzydlo	*Fatsia japonica*	11/15

- Climate signals from Neogene taxa in European records referred to East Asian plants (and implications in palaeoclimate reconstruction) (T. Utescher)

The HUTEA concept proposed by Martinetto et al. (2015) in the actual synthesis volume of NECLIME was outlined in a presentation (T. Utescher) and discussed. This very promising concept was developed to trace the loss in biodiversity in the northern Italian flora throughout the late Neogene Cooling. HUTEA (humid thermophilous taxa of East Asian affinity) taxa are defined by a MATmin of at least 9 °C, and a MAPmin of 800 – 1,000 mm, thresholds that about coincide with a Cfa type climate according to the Koeppen-Geiger classification (there MAT > 10 °C). CTEA (cold-tolerant taxa of East Asian affinity) taxa, in contrast, may tolerate cooler climate conditions. Nevertheless, they are no more present in the modern European flora. In this context it is interesting to note that with the given climatic thresholds HUTEA taxa would have no problems in todays climate of Northern Italy (Parma station: MAT 13.8 °C ; MAP 843 mm).



In search for MATmin, here for the Litsea genus: zonal (Palaeoflora, based on the northern limit of the widely distributed L. pungens) vs. extrazonal (Martinetto et al., 2015, based on relictual occurrence of L. moupinensis at high altitude) solutions.

Although only a minor part of HUTEA/CTEA taxa are represented by Neogene palynomorph spetra the concept is considered an important new proxy, also for palynological studies to be e.g. complementarily used together with the Palaeotropical / Arctotertiary concept.

Martinetto et al. (2015) scored a total of 68 modern taxa with respect to their MATmin in order to classify them in terms of HUTEA/CTEA. The authors provide information on the exact location where MATmin has been identified in each case, and use regional lapse rates to estimate temperature at a

given altitude. On this occasion, data entries in the Palaeoflora Database available for these 68 genera were checked using primary sources (station data and distribution maps) and corrected where necessary. The data published in Martinetto et al. (2015) contain information on MATmin only and are not directly referable to a meteorological station while most Palaeoflora climate data sets include various variables, and refer to meteorological stations. This concept was left untouched because station data provide internally consistent climatic information, and minor deviations are tolerated.

When comparing both data sets it is shown that in ca. 50% of the cases MATmin data from Martinetto et al. (2015) and Palaeoflora data can be accommodated when permitting a tolerance of 2 °C. In ca. 8% of cases; the Martinetto et al. (2015) data are warmer by more than 2 °C. These cases concern mainly CTEA taxa and can be referred to the fact that for this study, mainly East Asian plant distribution was considered while the respective genera occur as well in other continental areas, partly under cooler conditions. For a total of 17 genera, Palaeoflora provides MATmin values exceeding the Martinetto et al. (2015) values by more than 2 °C (7 genera by up to 3 °C, for 10 genera > 3 °C). It is important to note that for 15 out of these 17 taxa, Martinetto et al. identified MATmin from plant occurrences at higher altitudes (> 1, 000 m) while Palaeolfora data mainly refer to low to mid-altitudinal stations (usually located near the northern plant distribution limit (NH) when identifying MATmin).

Climate data collected for high altitude stands may be relevant when reconstructing past climates of mountainous areas where such thresholds can be tested in cases of non-overlapping. However, it should be noted that even when using high-resolving climatological grids and adjusted lapse rates, a variety of factors such as slope, exposition and snow depth may introduce considerable uncertainties that are hardly quantifiable. Therefore, thresholds generated using the zonal limits of plant species, such as data provided in the Palaeoflora, are considered more suitable to reconstruct regional climates from Neogene palynomorph records, at least under the palaeoenvironmental settings usually encountered.

MATmin Martinetto et al., 2015	Modern boundary species	Modern MATmin site	Altitude (m)	CTEA or HUTEA	Palaeoflora Database, at genus level
-2.0	*Acanthopanax senticosus* (Rupr. et Maxim.) Harms	Nikolaevsk-na-Amure, Russia	-	CTEA	0
0.7	*Actinidia kolomikta* (Maxim. et Rupr.) Maxim.	Blagovescensk, Russia	-	CTEA	-1.7
6.3	*Alangium platanifolium* (Sieb.etZucc.)Harms var.trilobum(Miq.)Ohwi	East Akita, Japan	750	CTEA	2.6
12.5	*Amentotaxus argotaenia* (Hance) Pilg.	Mt Emei, Suchuan, China	1300/FOC 1,100 m	HUTEA(remove?)	12.9
1.8	*Ampelopsis brevipedunculata* Trautv.	Habarovsk, Russia	-	CTEA	0
1.8	*Aralia elata* (Miq.) Seemann	Habarovsk, Russia	-	CTEA	-5.5
7.8	*Azolla filiculoides* Lam.	Alaska, USA	-	removed from HUTEA	8.4
5.8	*Boehmeria sylvestris* (Pamp.) Wot.Wang	East Akita, Japan	850	CTEA	
3.6	*Carya cordiformis* (Wangenh.) K. Koch	North America		CTEA	5.7
9.2	*Cathaya argyrophylla* Dhun et Kuang	Mt Jinfo, Chongching, China	1800	removed from HUTEA	13,4
6.1	*Cephalanthus occidentalis* L.	New Brunswick, East Canada	-	CTEA	4.7
4.5	*Cephalotaxus harringtonia* (Knight) K.Koch	Mt. Naeba, South Niigata, Japan	1540	CTEA	7.6
-2.0	*Chamaecyparis nootkatensis* (D. Don) Spach	North America		CTEA	1.8
8.7	*Cinnamomum longepaniculatum* (Gamble) N. Chao ex H.W.Li	Mt Emei, Suchuan, China	2000	HUTEA	12.6
2.7	*Clethra barbinervis* Sieb. et Zucc.	Kurobe, Toyama, Japan	1850	CTEA	7.4
15.6	*Craigia yunnanensis* W.W.Smith et W.E.Evans.	Mt. Gaoligong, Yunnan, China	1700	HUTEA	15.6
3.8	*Cryptomeria japonica* (L. fil.)D.Don	Kurobe, Toyama, Japan	1650	CTEA	3.8
14.2	*Cyclea racemosa* Oliv.	Mt.Longi, Fujian, China	1000	HUTEA	14.7
10.7	*Cyclocarya paliurus* (Batal.) Iljinsk.	Shennongjia, East Hubei, China	1800	HUTEA	12.9
11.7	*Ehretia acuminata* R.Br. var. *obovata* (Lindl.) Johnst.	North Kumamoto, Japan	850	HUTEA	9.5
11.7	*Engelhardtia roxburgihiana* Wall.	Mt Emei, Suchuan, China	1450	HUTEA	13.8
7.8	*Eucommia ulmoides* Oliv. (cultivated)	Foping, Shaanxi, China	1600	HUTEA(remove?)	10.6
5.5	*Eurya aurea* (Levl.) Hu et L.K.Ling	Mt Emei, Suchuan, China	2600	CTEA	9.1
1.8	*Euryale ferox* Salisb.	Bikin, Russia	-	CTEA	
16.2	*Glyptostrobus pensilis* (Staunton ex D. Don) K. Koch	Zixing, S. Hunan, China	450	HUTEA	not used
1.3	*Juglans cinerea* L.	North America		CTEA	0
4.4	*Liriodendron tulipifera* L.	North America		CTEA	6
3.3	*Litsea moupinensis* Lecomte	Mt Emei, Suchuan, China	3000	CTEA	11.7
2.3	*Magnolia salicifolia* (Sieb. et Zucc.) Maxim.	Mt. Hakuba, Nagano, Japan	1950	CTEA	4.1
6.6	*Mahonia polydonta* Fedde	Mt Emei, Suchuan, China	2400	CTEA	5.4
8.5	*Mallotus japonicus* (Thunb.) Muell.-Arg.	Central Sizuoka, Japan	1150	HUTEA	10
9.1	*Meliosma veitchoiorum* Hemsley	Mt. Tianmu, Zhejiang, China	1500	HUTEA	9.5
6.2	*Meliosma tenuis* Maxim.	Northeast Fukui, Japan	1250	CTEA	7.8
0.7	*Menispermum dauricum* DC.	Blagovescensk, Russia	-	CTEA	-1.2
1.4	*Morella pensylvanica* (Mirb.) Kartesz	North America		CTEA	
2.3	*Morus australis* Poir.	Juzhno-Sakhalinsk, Russia	-	CTEA	3.1
4.5	*Nyssa sylvatica* Marshall	North America		CTEA	4.4
7.9	*Paulownia tomentosa* (Thunb.) Steuder	East Akita, Japan	450	HUTEA	7,8
0.7	*Phellodendron amurense* Rupr.	Blagovescensk, Russia	-	CTEA	0

6.1	*Phytolacca americana* L.	New Brunswick, East Canada	-	CTEA	
4.4	*Picea smithiana* (Wall.) Boiss.	Gyirong, Southwest Tibet, China	3200	CTEA	-8.9
1.8	*Pilea hamaoi* Makino	Habarovsk, Russia	-	CTEA	
10.5	*Pseudolarix amabilis* (J. Nelson) Rehder	Mt. Tianmu, Zhejiang, China	1200	removed from HUTEA	10.6
-3.9	*Pseudotsuga menziesii* (Mirb.) Franco	North America		CTEA	-4
3.1	*Pterocarya rhoifolia* Sieb. et Zucc.	Nakawa, Nagano, Japan	1850	non-CTEA	3.9
9.6	*Rehderodendron macrocarpum* Hu	Mt Emei, Suchuan, China	1900	HUTEA	11.1
7.7	*Sabia yunnanensis* Franch	Mt Emei, Suchuan, China	2200	HUTEA	10
10.0	*Sargentodoxa cuneata* (Oliv.) Rehd. et Wils.	Foping, Shaanxi, China	1400	HUTEA	12.6
5.6	*Sassafras albidum* (Nutt.) Nees	North America		CTEA	6.5
10.9	*Saurauia polyneura* C.F.Liang et Y.S.Wang	Mt. Gaoligong, Yunnan, China	2600	HUTEA	11,6
0.7	*Schisandra chinensis* (Turcz.) Baill.	Blagovescensk, Russia	-	CTEA	0
10.2	*Sinomenium acutum* (Thunb.) Rehd. et Wilson	Foping, Xhangxi, China	1350	HUTEA	13.6
15.2	*Stemona tuberosa* Lour.	Mt Emei, Suchuan, China	800	HUTEA	
4.3	*Stewartia monadelpha* Sieb. et Zucc.	Central Sizuoka, Japan	1850	CTEA	4.9
5.0	*Styrax obassia* Sieb. et Zucc.	Asahikawa, Hookaido, Japan	300	CTEA	5
8 (6)	*Symplocos phyllocalyx* C.B.Clarke	Mt Emei, Suchuan, China	2500	added to the HUTEA	13.6
4.4	*Symplocos sawafutag*i Nagam. (S.chinensis)	Hotaka, Nagano, Japan	1650	CTEA	4.5
10.4	*Taiwania cryptomerioides* Hayata	Central Taiwan, China	2600	HUTEA	10,4
11.8	*Ternstroemia gymnanthera* (Wight et Arn.) Bedd	Mt.Kirishima, Miyazaki, Japan	700	HUTEA	9,1,
10.1	*Tetrastigma hemsleyanum* Diels et Gilg	Mt Emei, Suchuan, China	1750	HUTEA	11,5
-4.0	*Thuja occidentalis* L.	North America		CTEA	-1.4
10.7	*Toddalia asiatica* (L.) Lam.	Shennongjia, East Hubei, China	1800	HUTEA	12,6
6.6	*Torreya nucifera* (L.)Sieb. et Zucc. var. radicans Nakai	Yamanouchi, Nagano, Japan	1200	CTEA	7.3
8.6	*Trichosanthes kirilowi* Maxim. var. *japonica* (Miq.) Kitamura	Komoro, Nagano, Japan	960	HUTEA	8,6
-6.5	*Tsuga mertensiana* (Bong.) Carrière	North America		CTEA	-5
10.8	*Turpinia affinis* Merr. et Perry	Mt.Foding, Guizhou, China	1800	HUTEA	14.7
7.8	*Wikstroemia trichotoma* Thunb	Mt. Shirakami, Kumamoto, Japan	1360	HUTEA	6.9
6.1	*Zanthoxylum piperitum* (L.) DC.	Yubari, Hokkaido, Japan	300	CTEA	3.4
			>1500 m		>2 °C cooler
			>1000 m		2-3 °C warmer
					>3 °C warmer

- next meeting of the working group

It was decided to have the next meeting of the working group still in 2016. Venue and dates of the meeting will be communicated to you within the forthcoming weeks.