Maryam Moshayedi, Olaf K. Lenz, Volker Wilde and Matthias Hinderer: The recolonization of volcanically disturbed Eocene habitats of Central Europe: The maar lakes of Messel and Offenthal (SW Germany) compared

Table 1:complete list of palynomorphs from Lake Offenthal and additional palynomorphs from Messel that are used for the comparison of Messel and Offenthal palynology

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variable used for cluster analysis and NMDS | Palynomorphs | Family/Genus | Occuring in Messel but absent in Offenthal | Used for Offenthal statistical analysis | Used for Offenthal and Messel statistical analysis |
| Leiotriletes spp. | *Leiotriletes maxoides* KRUTZSCH, 1962 | Schizaeaceae |  | + | + |
|  | *Leiotriletes microadriennis* KRUTZSCH, 1959 | Schizaeaceae,Lygodium |  |  |  |
| Echinatisporites | *Echinatisporis longechinus* KRUTZSCH, 1959 | Selaginellaceae |  | + | + |
| Trilites spp. | *Trilites solidus* (R. POTONIÉ 1934) KRUTZSCH, 1959 | Schizaeaceae |  | + | + |
|  | *Trilites menatensis* KEDVES 1982 | Schizaeaceae |  |  |  |
| Cicatricosisporites spp. | *Cicatricosisporites dorogensis R.* Potonié & Gelletich 1933 | Parkeriaceae?,  Schizaeaceae?, Polypodiaceae | + |  | + |
| Ischyasporites spp. | *Ischyasporites tertiarius* KRUTZSCH (Manuskript) ex ROCHE 1973  *Ischyasporites asolidus* (KRUTZSCH, 1959) KRUTZSCH, 1967 | ?  Schizaeaceae |  | + | + |
| Baculatisporites spp | *Baculatisporites primarius* (WOLF 1934) THOMSON & PFLUG 1953 | Osmundaceae |  | + | + |
|  | *Baculatisporites gemmatus* KRUTZSCH, 1959 | Osmundaceae |  |  |  |
| Tegumentisporites spp. | *Tegumentisporis sculpturoides* (KRUTZSCH 1959) KRUTZSCH 1963 | Selaginellaceae |  | + | + |
|  | *Tegumentisporis tegumentis* (KRUTZSCH 1959) KRUTZSCH 1963 | Selaginellaceae |  |  |  |
|  | *Tegumentisporis villosoides* (KRUTZSCH 1959) KRUTZSCH 1963 | Selaginellaceae |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| Polypodiaceoisporites spp. | *Polypodiaceoisporites gracillimus* NAGY 1963 | Polypodiaceae |  | + | + |
|  | *Polypodiaceoisporites lusaticus* KRUTZSCH 1967 | Polypodiaceae |  |  |  |
| Camarozonosporites spp. | *Camarozonosporites heskemensis* (PFLANZL 1955) Krutzsch 1959 | Lycopodiaceae |  | + |  |
|  | *Camarozonosporites decorus* (WOLFF 1934) KRUTZSCH 1959 | Lycopodiaceae |  |  |  |
|  | *Camarozonosporites semilevis* KRUTZSCH 1963 | Lycopodiaceae |  |  |  |
| Laevigatosporites spp. | *Laevigatosporites haardtii* (R. Potonié & VENITZ 1934) THOMSON & PFLUG 1953 | Polypodiaceae |  | + | + |
|  | *Laevigatosporites discordatus* PFLUG 1953 | Polypodiaceae |  |  |  |
| Punctatosporites | *Punctatosporites palaeogenicus* KRUTZSCH 1959 | Polypodiaceae |  | + | + |
| Verrucatosporites spp. | *Verrucatosporites favus* (R. POTONIÉ´ 1931) THOMSON & PFLUG 1953 | Polypodiaceae |  | + | + |
| Pityosporites | *Pityosporites labdacus* (R. POTONIÉ´ 1931) THOMSON & PFLUG 1953 | Pinaceae |  | + | + |
| Inaperturopollenites spp. | *Inaperturopollenites dubius* (R. Potonié & VENITZ 1934) THOMSON & PFLUG 1953 | Cupressaceae |  | + | + |
|  | *Inaperturopollenites concedipites* (WODEHOUSE 1933) KRUTZSCH 1971 | Cupressaceae |  |  |  |
|  | *Inaperturopollenites magnus* (R. POTONIÉ´ 1934) THOMSON & PFLUG 1953 | Pinaceae? |  |  |  |
| Milfordia spp. | *Milfordia minima* KRUTZSCH 1970 | Restionaceae |  | + | + |
|  | *Milfordia incerta* (THOMSON & PFLUG 1953) KRUTZSCH 1961 | Restionaceae |  |  |  |
| Emmapollis | *Emmapollis pseudoemmaensis* KRUTZSCH 1970 | Chloranthaceae |  | + | + |
| Monocolpopollenites spp. | *Monocolpopollenites crassiexinus* THIELE-PFEIFFER 1988 | Nymphaeaceae |  | + | + |
|  | *Monocolpopollenites tranquillus* (R. POTONIÉ´ 1934) THOMSON & PFLUG 1953 | Nymphaeaceae |  |  |  |
| D. kockeli | *Dicolpopollis kockeli Pflanzl 1956* | Arecaceae, Calamus | + |  | + |
| Punctilongisulcites | *Punctilongisulcites microechinatus* KRUTZSCH 1970 | Hydrocharitaceae |  | + | + |
| Nudopollis | *Nudopollis terminalishastaformis* (THOMSON & PFLUF 1953) PFLUG 1953 spp. *Hastaformis* THOMSON & PFLUG 1953 | ? |  | + | + |
| Interpollis spp. | *Interpollis supplingensis* (PFLUG 1953) KRUTZSCH 1961 | ? |  | + | + |
|  | *Interpollis microsupplingensis* KRUTZSCH 1961 | ? |  |  |  |
| Plicapollis spp. | *Plicapollis pseudoexcelsus* (KRUTZSCH 1957) KRUTZSCH 1961 ssp. *turgidus* PFLUG 1953 | Juglandaceae? |  | + | + |
|  | *Plicapollis pseudoexcelsus* (KRUTZSCH 1957) KRUTZSCH 1961 ssp. *semiturgidus* PFLUG 1953 | Juglandaceae? |  |  |  |
|  | *Plicapollis pseudoexcelsus* (KRUTZSCH 1957) KRUTZSCH 1961 ssp. *microturgidus* PFLUG 1953 | Juglandaceae? |  | + | + |
| Triatriopollenites spp. | *Triatriopollenites excelsus* (R. Potonié 1931) Thomson & Pflug 1953 | Myricaceae, Juglandaceae? |  | + | + |
|  | *Triatriopollenites excelsus* (R. Potonié 1931) Thomson & Pflug 1953 minor Pflug 1953 | Myricaceae, Juglandaceae? |  |  |  |
|  | *Triatriopollenites rurensis* Thomson & Pflug 1953 | Myricaceae, Myrica |  |  |  |
|  | *Triatriopollenites bituitus* (R. Potonié 1931) Thomson & Pflug 1953 | Myricaceae, Myrica |  |  |  |
| Labraferoidaepollenites | *Labraferoidaepollenites menatensis* Kedves 1982 |  | + |  | + |
| Plicatopollis spp. | *Plicatopollis plicatus* (R. POTONIÉ´ 1934) KRUTZSCH 1962 | Juglandaceae |  | + | + |
|  | *Plicatopollis lunatus* KEDVES 1974 | Juglandaceae |  |  |  |
|  | *Plicatopollis hungaricus* KEDVES 1974 | Juglandaceae |  |  |  |
| Momipites spp. | *Momipites punctatus* (R. POTONIÉ´ 1931) NAGY 1969 | Juglandaceae |  | + | + |
|  | Momipites quietus (R. POTONIÉ´ 1931) NICHOLS 1973 | Juglandaceae |  |  |  |
| Platycaryapollenites spp. | *Platycaryapollenites platycaryoides* (ROCHE 1969) KEDVES 1982 | Juglandaceae, Platycarya |  | + | + |
|  | *Platcacaryapollenites semicyclus* (KRUTZSCH & VANHOORNE 1977) THIELE-PF. 1988 | Juglandaceae,Platycarya |  |  |  |
|  | *Platcacaryapollenites anticyclus* KRUTZSCH & VANHOORNE 1977 | Juglandaceae,Platycarya |  |  |  |
| Pterocarya | *Pterocaryapollenites stellatus* (R. Potonie 1931) Thiergart 1937 | Juglandaceae, Pterocarya | + |  | + |
| Caryapollenites spp. | *Caryapollenites triangulus* (PFLUG 1953) KRUTZSCH 1961 | Juglandaceae,Carya |  | + | + |
|  | *Caryapollenites circulus* (PFLUG 1953) KRUTZSCH 1961 | Juglandaceae,Carya |  |  |  |
| Subtriporopollenites spp. | *Subtriporopollenites anulatus* Thomson & Pflug 1953 nanus Thomson & Pflug 1953 | Juglandaceae |  | + | + |
|  | *Subtriporopollenites constans* Pflug 1953 | ? |  |  |  |
|  | *Subtriporopollenites geiseltalensis* Krutzsch 1968 | Sterculiaceae?, Mansonia? |  |  |  |
|  | *Subtriporopollenites magnoporatus* (THOMSON & PFLUG 1953) KRUTZSCH 1961 | ? |  |  |  |
| T. rhenanus | *Triporopollenites rhenanus* (Thoms. in R. Pot., Thoms. & Thierg. 1950) Th. & Pf. 1953 | Betulaceae, Ostrya | + |  | + |
|  | *Triporopollenites robustus* Pflug 1953 | Betulaceae? |  |  |  |
|  | *Triporopollenites megagranifer* (R. Potonie 1931) Thomson & Pflug 1953 | Betulaceae |  |  |  |
| Polyporopollenites spp. | *Polyporopollenites verrucatus* THIELE-PFEIFFER 1980 | Ulmaceae, Hemiptelea |  | + | + |
|  | *Polyporopollenites eoulmoides* Krutzsch & Vanhoorne 1977 | Ulmaceae |  |  |  |
|  | *Polyporopollenites undolosus* (Wolf 1934) Thomson & Pflug 1953 | Ulmaceae, Ulmus, Zelkova |  |  |  |
| Celtipollenites spp. | *Celtipollenites intrastructurus* (KRUTZSCH & VANHOORNE 1977) THIELE-PFEIFFER 1980 | Ulmaceae, Celtis |  | + | + |
|  | *Celtipollenites laevigatus* THIELE-PFEIFFER 1988 | Ulmaceae |  |  |  |
| Intratriporopollenites spp. | *Intratriporopollenites microinstructus* KRUTZSCH & VANHOORNE 1977 | Malvaceae |  | + | + |
|  | *Intratriporopollenites minimus* Mai 1961 | Malvaceae |  |  |  |
| Bombacaceae | *Bombacacidites tilioides* Krutzsch 1970 | Bombacaceae |  | + | + |
|  | *Bombacacidites* sp. | Bombacaceae |  |  |  |
| Porocolpopollenites | *Porocolpopollenites rarobaculatus* THIELE-PFEIFFER 1980 | Symplocaceae, Symplocus |  | + | + |
| Symplocospollenites | *Symplocospollenites orbis* (THOMSON & PFLUG 1953) R: POTONIÉ´ 1960 | Symplocaceae |  | + | + |
| Labrapollis | *Labrapollis labraferus* (R: POTONIÉ´ 1931) KRUTZSCH 1968 | ? |  | + | + |
| Compositopollenites | *Compositoipollenites rhizophorus* (R: POTONIÉ´ 1934) ) R: POTONIÉ´ 1960 | Icacinaceae |  | + | + |
| Pentapollis | *Pentapollis pentangulus* (PFLUG 1953) KRUTZSCH 1957 | ? |  | + | + |
| T. liblarensis | *Tricolpopollenites liblarensis* (THOMS. in R. POT., THOMS. & THIERG. 1950) TH. & PF. 1953 *liblarensis* (THOMS. in R. POT., THOMS. & THIERG. 1950) TH. & PF. 1953 | Fagaceae, Fabaceae, Combretaceae, Verbenaceae |  | + | + |
|  | *Tricolpopollenites liblarensis* (THOMS. in R. POT., THOMS. & THIERG. 1950) TH. & PF. 1953 *fallax* (R. POTONIÉ´ 1934) THOMSON & PFLUG 1953 | Fagaceae, Fabaceae, Combretaceae, Verbenaceae |  |  |  |
| T. quisqualis | *Trocolpopollenites quisqualis* (R: POTONIÉ´ 1934) THOMSON & PFLUG 1953 | Fagaceae? |  | + | + |
| T.asper | *Tricolpopollenites asper* Thomson & Pflug 1953 | Fagaceae, Quercus? | + |  | + |
| T. microhenrici | *Tricolpopollenites microhenrici* (R: POTONIÉ´ 1931) THOMSON & PFLUG 1953 | Fagaceae |  | + | + |
| T. retiformis | *Tricolpopollenites retiformis* THOMSON & PFLUG 1953 | Salicaceae, Salix |  | + | + |
| T. vegetus | *Tricolpopollenites vegetus* (R: POTONIÉ´ 1934) THOMSON & PFLUG 1953 | Hamamelidaceae |  | + | + |
| T. cingulum | *Tricolporopollenites cingulum* (R. POTONI E´ 1931) THOMSON & PFLUG 1953 *fusus* (R. POTONIÉ´ 1931) THOMSON & PFLUG 1953 | Fagaceae, Castanopsis? |  | + | + |
|  | *Tricolporopollenites cingulum* (R. POTONIÉ´ 1931) THOMSON & PFLUG 1953 *pusillus* (R. POTONIÉ´ 1934) THOMSON & PFLUG 1953 | Fagaceae, Castanopsis, Lithocarpus, Pasania |  |  |  |
|  | *Tricolporopollenites cingulum* (R. POTONIÉ´ 1931) THOMSON & PFLUG 1953 *oviformis* (R. POTONIÉ´ 1931) THOMSON & PFLUG 1953 | Fagaceae, Castanea, Castanopsis, Lithocarpus, Pasania |  |  |  |
| T. pseudocingulum | *Tricolporopollenites pseudocingulum* (R. POTONIÉ´ 1931) THOMSON & PFLUG 1953 | ? |  | + | + |
| T. megaexactus | *Tricolporopollenites megaexactus* (R. POTONIÉ´ 1931) THOMSON & PFLUG 1953 | Cyrillaceae |  | + | + |
| Edmundi group | *Tricolporopollenites edmundi* (R. POTONIÉ´ 1931) THOMSON & PFLUG 1953 | Mastixiaceae |  | + | + |
| T. marcodurensis | *Tricolporopollenites marcodurensis* THOMSON & PFLUG 1953 Typ A & B | Vitaceae |  | + | + |
| T. microreticulatus | *Tricolporopollenites microreticulatus* THOMSON & PFLUG 1953 | Oleaceae |  | + | + |
| T. parmularius | *Tricolporopollenites parmularius* (R. POTONIÉ´ 1934) KRUTZSCH in KRUTZSCH, PCHALEK & SPIEGLER 1960 | Eucommiaceae |  | + | + |
| T: microporitus | *Tricolporopollenites microporitus* THOMSON & PFLUG 1953 | Hamaelidaceae/Verbenaceae/Oleaceae? |  | + | + |
| T. crassiexinus | *Tricolporopollenites crassiexinus* KRUTZSCH & VANHOORNE 1977 | Celastraceae |  | + | + |
| T. eofagoides | *Tricolporopollenites eofagoides* KRUTZSCH & VANHOORNE 1977 | ? |  | + | + |
| T. vancampoae | *Tricolporopollenites vancampoae* KEDVES 1964 | ? |  | + | + |
| T. solé de portai | *Tricolporopollenites solé de portai* Kedves 1965 | Anacardiaceae, Rosaceae | + |  | + |
| T. quercioides | *Tricolporopollenites cf. quercioides* Krutzsch & Vanhoorne 1977 | ? | + |  | + |
| T. messelensis | *Tricolporopollenites messelensis* Thiele-Pfeiffer 1988 | ? | + |  | + |
| T. belgicus | *Tricolporopollenites belgicus* Krutzsch & Vanhoorne 1977 | ? | + |  | + |
| T. abbreviatus | *Tricolporopollenites abbreviatus* (R. Pot. 1934) Krutzsch 196 | ? | + |  | + |
| T. mansfeldensis | *Tricolporopollenites mansfeldensis* KRUTZSCH 1969 | Rhizophoraceae |  | + | + |
| T. megaporatus | *Tricolporopollenites quercioides* KRUTZSCH & VANHOORNE 1977 | ? |  | + | + |
| T. crassostriatus | *Tricolporopollenites crassostriatus* NICKEL 1996 | Solanaceae |  | + | + |
| Nyssapollenites spp. | *Nyssapollenites kruschii* (R. POT. 1931) NAGY 1969 *analepticus* (R. POT. 1934) NAGY 1969 | Nyssaceae,Nyssa |  | + | + |
|  | *Nyssapollenites kruschii* (R. POT. 1931) R. POT., TH. & THIERG. 1950 *accessorius* (R. POT. 1934) R. POT., TH. & THIERG. 1950 ex SIMONCSICS 1969 | Nyssaceae,Nyssa |  |  |  |
| I.lexpollenites spp. | *Ilexpollenites iliacus* (R. POTONIÉ´ 1931) THIERGART 1937 ex R. POTONIÉ´ 1960 | Aquifoliaceae |  | + | + |
|  | *Ilexpollenites margaritatus* (R. POTONIÉ´ 1931) THIERGART 1937 ex R. POTONIÉ´ 1960 | Aquifoliaceae |  |  |  |
| Araliaceoipollenites spp. | *Araliaceoipollenites euphorii* (R. POTONIÉ´ 1931a) R. POTONIÉ´ 1951 | Araliaceae |  | + | + |
|  | *Araliaceoipollenites reticuloides* THIELE-PFEIFFER 1980 | Araliaceae |  |  |  |
| Tetracolporopollenites spp | *Tetracolporopollenites sapotoides* THOMSON & PFLUG 1953 | Sapotaceae | + |  | + |
|  | *Tetracolporopollenites kirchheimeri* THOMSON & PFLUG 1953 | Sapotaceae |  |  |  |
|  | *Tetracolporopollenites obscurus* THOMSON & PFLUG 1953 | Sapotaceae |  |  |  |
| Ericipites spp. | *Ericipites callidus* (R. POTONIÉ´ 1931) KRUTZSCH 1970 | Ericaceae |  | + | + |
|  | *Ericipites ericius* (R. POTONIÉ´ 1931) R. POTONIÉ´ 1960 | Ericaceae | + |  | + |
| Botryococcus | *Botryococcus* cf. *braunii* KU¨ TZING 1849 | Chlorophyta |  | + | + |
| Ovoidites | *Ovoidites* POTONIÉ´ 1951 | Chlorophyta |  | + | + |
| Entophyctislobata | *Entophlyctis lobate* WILLOUGHBY AND TOWNLEY 1961 | Endochytriaceae |  | + | + |