BLUMEA 31 (1985) 123–127

ULMUS POLLEN AT SIBISA SWAMP, NORTH SUMATRA (ULMACEAE)

B. K. MALONEY

Department of Geography and The Palaeoecology Centre, Queen's University, Belfast, Northern Ireland

Ulmus pollen characterised by a four-pored morphology was reported from samples of various ages taken from the radiocarbon dated pollen sites of Pea Sim-sim and Tao Sipinggan and in one sample from the undated Pea Sijajap record (Maloney, 1984). All these sites are located on the Toba Plateau, south of Lake Toba, over 50 km away from the nearest existing sources (Touw & Van Steenis, 1968) of *Ulmus lancaeafolia* Roxb. ex Wall. Sibisa Swamp is situated east of Lake Toba, at 98°58′E, 2°33′N, near the tourist resort of Prapat and much closer to the Karo Highlands source. It is in an area of fresh-looking volcanic topography at an altitude of c. 1300 m.

The site was discovered and cored by Flenley and Morley in 1972 (cf. Morley et al., 1973). They described the vegetation of the swamp as somewhat disturbed and including a variety of species characteristic of swamps in central Sumatra, of which three: *Eleocharis sp., Xyris cf. capensis* and *Blechnum orientale* were listed. The writer made additional borings in 1973 but the longest was only 1.50 m deep. It can be added that the centre of the swamp was dominated by *Eleocharis ochrostachys* Steud. with some *Xyris capensis* Thunb. and that the *Blechnum orientale* L. formed an outer vegetation ring. The deepest boring was made at the centre of the site. Samples were taken at 5 cm intervals but complete cores sections were not sent back to the laboratory and larger samples selected for possible $_{14}C$ dating have, unfortunately, been mislaid over time.

A number of samples were chemically prepared using the 'exotic' spore method of Stockmarr (1971) in August 1984, well outside the normal period when elm flowers in Northern Ireland. So far only one sample, that from 1.45 m depth, has been analysed but as time is unlikely to be available for a complete analysis of all the samples from the site for a number of years due to other commitments, it was thought best to report upon it now. Two pollen grains of elm were encountered in a total pollen and spore count of 2901 (0.16% of total pollen). Pollen and spores were extremely abundant both in numbers (c. 1.9 million grains/g dry weight) and types (87 different pollen taxa and 34 spore types), see table 1. Myrtaceae and Fagaceae pollen dominated but *Ilex* was also important. Lower montane forest (Fago-Laura-

Table 1. Pollen and spore percentages and concentrations.

Taxon	% of total pollen	Concen-tration*	Taxon	% of total pollen	Concen-tration*
Pollen types			*Labiatae*	0.25	2,002
			Lagerstroemia	0.25	2,002
Acalypha	0.16	1,335	Ligustrum	0.08	667
Adinandra comp.	0.66	5,340	Limnophila sim.	0.74	6,007
Altingia excelsa	4.05	32,705	Lindernia sim.	1.24	10,012
Amaranthaceae/			*Loranthaceae*	0.16	1,335
Chenopodiaceae	0.08	667	Macaranga small	2.90	23,361
Ampelocissus	0.08	667	Macaranga large	0.66	5,340
Antidesma	0.33	2,670	Maesa	0.33	2,670
Ardisia	0.16	1,335	Magnolia	0.08	667
Arisaema comp.	0.08	667	*Malpighiaceae*	0.16	1,335
Burmannia comp.	0.33	2,670	Mastixia	0.16	1,335
Canarium	1.24	10,012	Medinilla	0.16	1,335
Caryota	0.08	667	Melastoma	0.58	4,672
Castanopsis/Lithocarpus	8.02	64,742	Mussaenda	0.08	667
Celtis id. wightii comp.	0.58	4,672	Myrsine	1.40	11,347
Croton type	0.08	667	Neonauclea type	0.66	5,340
Cyperaceae undiff.	0.08	667	Picrasma comp.	0.16	1,335
Cyperus comp.	0.08	667	Podocarpus id. amarus		
Dacrycarpus imbricatus	0.16	1,335	comp.	0.25	2,002
Dacrydium elatum	1.98	16,019	Podocarpus id. neriifolius		
Daemonorops comp.	0.08	667	comp.	0.08	667
Decaspermum comp.	0.25	2,002	Polyalthia	0.16	1,335
Elaeocarpus	0.33	2,670	Polygonum id. chinensis		
Eleocharis	1.40	11,347	comp.	0.16	1,335
Endospermum sim.	0.08	667	Prunus comp.	0.50	4,005
Engelhardia	0.41	3,337	Psychotria id. sarmentosa		
Eugenia comp.	23.72	191,557	sim.	0.16	1,335
Evodia	0.50	4,005	Quercus	5.62	45,386
Ficus	0.16	1,335	Rhododendron type	0.16	1,335
Fimbristylis comp.	0.25	2,002	Rubus	0.16	1,335
Garcinia	0.25	2,002	Santiria comp.	0.16	1,335
Gramineae	9.67	78,091	Saurauia	1.73	14,016
Grewia	0.16	1,335	Schima wallichii	0.16	1,335
Haloragis/Laurembergia	0.66	5,340	Scirpus comp.	7.77	62,740
Haloragis id. micrantha			Styrax	0.16	1,335
comp.	0.16	1,335	Symingtonia populnea	0.25	2,002
Hedyotis	0.41	3,337	Symplocos pendula type	0.33	2,670
Hydrocotyle	0.16	1,335	Trema	0.41	3,337
Hymenodictyon comp.	0.08	667	Typha id. angustifolia		
Ilex id. cymosa comp.	1.32	10,679	comp.	0.58	4,672
Ilex undiff.	8.92	72,084	Ulmus	0.16	1,335
Impatiens id. platypetala			*Urticaceae/Moraceae*		
comp.	0.83	6,674	spherical, psilate	0.58	4,572
Iodes sim.	0.08	667	*Urticaceae/Moraceae*		
Korthalsia comp.	0.16	1,335	spherical, scabrate	0.08	667

(Table 1 continued)

Taxon	% of total pollen	Concentration*
Vaccinium type	0.08	667
Vernonia arborea	0.08	667
Vernonia undiff.	0.50	4,005
Xyris	0.82	6,674
Zanthoxylum	0.41	3,337
Unknown (2 types)	0.16	1,335
Spore types		
Filices monolete psilate small	83.4	673,453
Filices monolete psilate large	6.20	50,058
Filices monolete scabrate small	0.08	667
Ampelopteris prolifera comp.	0.08	667
Asplenium nidus	0.50	4,005
Asplenium id. longissimum comp.	0.08	667
Asplenium id. normale comp.	0.66	5,340
Blechnum comp.	0.66	5,340
Crypsinus	3.88	31,370
Cyathea sect. Alsophila	0.08	667
Cyathea sect. Sphaeropteris	0.08	667
Cyatheaceae undiff.	6.86	55,398
Davallia comp.	0.41	3,337
Dicranopteris id. linearis var. linearis comp.	7.68	62,072
Dicranopteris comp. linearis var. subpectinata	2.31	18,688
Hypolepis	1.07	8,677
Leucostegia type	1.24	10,012
Lindsaea id. orbiculata comp.	0.74	6,007
Lindsaea comp.	0.25	2,002
Lycopodium cernuum	3.72	30,035
Lycopodium phlegmaria type	0.33	2,670
Microlepia comp.	0.74	6,007
Nephrolepis	3.55	28,700
Ophioglossum id. pendulum comp.	0.16	1,335
Polypodium type small areolae	5.37	43,384
Polypodium type large areolae	2.97	24,028
Polypodium type subverrucate-areolate	4.13	33,372
Pteridium	0.99	8,009
Pteris vittata	0.16	1,335
Pteris id. biaurita comp.	0.08	667
Pteris undiff.	0.33	2,670
Selaginella id. involvens comp.	0.08	667
Selaginella undiff.	0.08	667
Sphaerostephanos unitus comp.	0.16	1,335
Undeterminable (all pollen grains)		
Corroded	0.50	4,005
Crumpled	0.33	2,670
Obscured	0.08	667
Others		
Sphagnum	2.97	24,028
Rhizopoda testae	0.08	667

* grains/g dry weight.

Note: Where a taxon carries a suffix, id. (idem) stresses that the determination is certain, comp. (comparatus) that it compares well with the stated taxon but could be from another genus or species, sim. (similis) that there is a similarity with the taxon named but more uncertainty than where comp. is used, and type where it is known that different species or genera have a similar pollen or spore morphology, e.g. *Rhododendron* type includes *Gaultheria*. Undiff. = undifferentiated.

Table 2. Diameters of grass pollen grains.

Diameter (μm)	Count size	Percentage of total
32	1	0.85
30	1	0.85
28	8	6.80
27	3	2.60
26	20	17.10
24	10	8.50
23	28	23.90
21	20	17.10
20	21	17.90
18	2	1.70
17	3	2.60

ceous forest) seems to have been present but there are indications that it was somewhat disturbed, e.g. the abundance of *Macaranga.* Most of the grass pollen (see table 2) has probably derived from swamp vegetation, however. The modal value of the 117 pollen grains measured was 23 μm, the same as that of *Leersia hexandra* Sw. (see Maloney, 1985). *Leersia* is a common occupant of the drier margins of swamps in the Toba Highlands and has a pollen size ranging from 19–24 μm. A number of other grasses found locally including *Arundinella setosa* Trin., which can grow on swamp, and *Imperata cylindrica* (L.) Beauv., a dry land species, have modal values of 26–28 μm.

What is clear from the data presented here is that *Ulmus* probably only formed a minor component of the mountain forest vegetation. Unfortunately no depositional basins with long sedimentary sequences were found north or west of Lake Toba during 1973 so additional areal comparisons cannot be made, and comparison with the dated Pea Sim-sim and Tao Sipinggan pollen diagrams suggests that if the disturbance was originated by man, the sample may be no more than 2,000 years old. If the disturbance is of natural origin, and the presence of fresh-looking volcanic topography nearby indicates that it might be, the sample could date to any time in the last 12,000 years. Analysis of the other samples from Sibisa Swamp may throw additional light on the history of elm in Sumatra but on the basis of evidence to hand, it would not be surprising to find that it is always a sporadic contributor to the pollen record.

REFERENCES

MALONEY, B.K. 1984. Pollen of Ulmus (Ulmaceae) in the subfossil record from North Sumatra: A note. Blumea 30: 69–70.

—— 1985. Grass pollen and the origins of rice agriculture in North Sumatra. Modern Quatern. Res. S.E. Asia 9 (in press).

MORLEY, R.J., J.R. FLENLEY & M.K. KARDIN. 1973. Preliminary notes on the stratigraphy of the swamps and small lakes of the Central Sumatran Highlands. Sumatra Res. Bull. 2: 50–60.

STOCKMAR, J. 1971. Tablets with spores used in absolute pollen analysis. Pollen et Spores 13: 615–621.

TOUW, A. & C.G.G.J. VAN STEENIS. 1968. Note on Ulmus in Malesia (Ulmaceae). Blumea 16: 84.