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6 The earliest occupation of Europe: the Elbe-Saale region (Germany)

The oldest Palaeolithic finds from the Elbe-Saale region date to the period between the Elsterian and the Saalian Glaciations. As indicated in the sequences at Bilzingsleben and Schöningen, there are three interglacials within this period, characterised by particular small vertebrate, molluscan and floral associations. The most important site is Bilzingsleben II, with a radiometric age of 350-400 Kyr BP, where hominid remains, assigned to a late representative of Homo erectus *have been found.*

1. Introduction

The Elbe-Saale region, the area between the northern uplands (*Mittelgebirge*: Thüringer Wald, Erzgebirge, Harz) and their northern foreland, is situated between 50 m and 1100 m above sea-level, whereas the altitude of the basins and the hilly regions ranges from 150 m to 350 m above sea level.

The Fennoscandinavian glaciers reached the northern edge of the *Mittelgebirge* several times during the Pleistocene and covered the Elbe-Saale region, the type area of the Elsterian and Saalian glaciation. The stratigraphic sequence and the chronostratigraphy of the Elbe-Saale region can be inferred from the interlacing of glacial sequences with periglacial deposits.

In 1908, E. Wüst (Wiegers 1928) drew attention to traces of human occupation in the Bilzingsleben travertine. He recognised its high age and assigned the travertine to the so-called "great interglacial" (Holsteinian Interglacial, "Holstein complex"). Woldstedt (1935), however, correlated the Bilzingsleben travertine with the last interglacial, thus establishing an incorrect idea which guided several geologists and archaeologists for a period of about 40 years (e.g. Toepfer 1960, 1970; Unger 1974). Isolated finds and small inventories of stone artefacts were still assigned to the Holsteinian Interglacial, e.g. Wangen, Wallendorf and other sites in the river gravels of the Elbe-Saale region. These finds were regarded as a strong evidence for the existence of the so-called "Clactonian" in the Elbe-Saale region (Collins 1968; Toepfer 1970). Specific conceptions of the mechanism of the climatically induced accumulation of river gravels and subsequent erosion led to the assignment of these finds to the early Saale glacial and to correlation with the Middle Acheulean of Markkleeberg, that unambiguously belongs to the early Saalian (Baumann and Mania 1983; Grahmann 1955). Apart from the Markkleeberg inventory, these finds represented the only evidence of the earliest occupation of the middle Elbe-Saale region for a long time.

Field research carried out during the last two decades has resulted in a more detailed subdivision of the period between the Elsterian and the Saalian glaciation (Cepek 1986; Erd 1973, 1978; Mania 1973; Mania and Altermann 1970; Mania and Mai 1969; Ruske 1964, 1965), and inventories of the so-called Clactonian can now be assigned to different phases of the "Holstein complex". Furthermore, in 1969, another find horizon in the travertine of Bilzingsleben was found (Grimm *et al.* 1974; Mania 1974). As a result, a site with possible occupation structures, with artefacts and, above all, with hominid remains was then excavated and at the same time a review of its stratigraphical position undertaken. The travertine of Bilzingsleben proved to be as old as E. Wüst had already suggested in 1908 and the site has become one of the most important sites of this period in Europe (Fischer *et al.* 1991; Mai *et al.* 1983; Mania and Weber 1986; Mania *et al.* 1980).

Recently, an important site was discovered in Middle Pleistocene interglacial deposits exposed in the brown-coal mine at Schöningen, in the northern Harz foreland (Fig. 1) (Thieme *et al.* 1992, 1993). Other smaller find complexes with a Middle Pleistocene age from the Saale region can be added to this list.

A possible explanation for the absence of older artefacts in the middle Elbe-Saale region may be that until recently flint artefacts were the primary objects of interest for archaeologists. This material was first transported into our working area within the ground-moraines of the Elsterian glaciation. However, in the context of the earliest occupation-debate it needs to be stressed that objects resembling typical pebble tools may be formed in a natural way, by mechanical action on pebbles found in debris and gravels without any human interference. A lot of pseudo-artefacts were collected and described as human cultural remains in the past (e.g. Andree 1939; Adrian 1982) but also, regrettably, this is still the case today (e.g. the *Alt-paläolithikum* of Widderstatt near Weimar, Schäfer 1989).

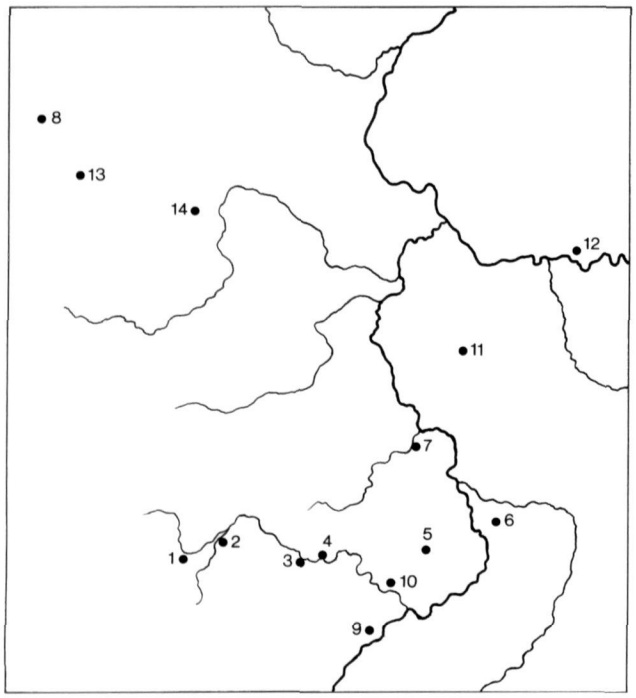

Fig. 1. The middle Elbe-Saale-Region with sites mentioned in the text. 1: Bilzingsleben, 2: Sachsenburg, 3: Memleben, 4: Wangen, 5: Neumark-Süd, 6: Wallendorf, 7: Köchstedt, 8: Schöningen, 9: Lengefeld-Bad Kösen, 10: Freyburg, 11: Edderitz bei Köthen, 12: Klieken, 13: Osterode/ Fallstein, 14: Schwanebeck/Huy.

2. Stratigraphy and chronology

The stratigraphical subdivision of the Pleistocene deposits in the Elbe-Saale region and its correlation to the chronological subdivision of the Pleistocene is a hotly debated item. There are various contradictory concepts. One is based on the assumption that the deposits represent only three major glaciation cycles and only two clear interglacial phases (Eissmann and Litt 1992). In this view the Saalian begins with the Fuhne glacial phase subdividing two Middle Pleistocene interglacials. The archaeological horizon of Bilzingsleben and the travertine embedding it were assigned to the latter of these interglacials, which implies that the entire Lower Palaeolithic of the region is correlated with the early Saalian. Consequently, the interglacial of Bilzingsleben is regarded to be a "longer interstadial phase" within the early Saalian. However, there is sufficient evidence of a Mediterranean flora, of a thermophile mixed oak forest and a fully developed *Helicigona banatica* fauna pointing to full *interglacial* conditions during formation of the Bilzingsleben travertine.

This chronostratigraphical model resulted in a reduced number of terraces (Fig. 2), by lumping terraces with little vertical distances and assuming that very thick gravel layers were deposited. Phases of gravel accumulation were restricted to the three major glacial phases. The bottom of the valley of the early Elsterian terrace is 40 to 45 m above the present river level and the bottom of the valley of the early Saalian terrace (*sensu stricto*) 15 to 16 m (e.g. Soergel 1924; Toepfer 1933). However, one terrace determined by these scholars could not be argued away by the simplified stratigraphy. The terrace is situated at 30 to 35 m above the river level and it is generally regarded as of late Elsterian origin. Other valley floors situated between 30 and 18 m above the river level are disregarded in this model. In my opinion this model is too simple. Detailed fieldwork has resulted in a more complex stratigraphical subdivision of the Middle Pleistocene sequence in the Elbe-Saale region and in the Harz foreland. This subdivision is mainly based on the stratigraphy of the terraces which will be described in the next section. First of all I will describe the basic cycle which can be observed in some terraces of the Saale, Ilm and Unstrut rivers.

The basic cycle begins with several m of gravels deposited during an early glacial phase. One or more horizons of frost structures, predominantly from a short pleniglacial phase, can be recognised within these gravels. The gravels are, at some places, covered by slope debris and loess. Erosion took place during a later phase of the glacial cycle and the river cut into and locally completely through the gravel deposits. Gravel deposits of low thickness, or even limnic-telmatic sequences of the subsequent interglacial, overlay the late glacial bottom of the valley. These fluvial sandy gravels and gravelly sands, generally 1 to 2 m thick, interlace with stagnant water sediments such as limnic-telmatic sequences and also with travertine sequences, or they are affected by interglacial weathering. Six of such terrace cycles have been observed in the lower valley of the Wipper near Bilzingsleben (Fig. 3). The corresponding early glacial valley floors are at 35 m, 27 m, 22 m, 18 m and 8 m above and 3 m below the present river level. The late glacial and interglacial sequence (the fluvial and limnic series and travertines) starts 1 to 2 m deeper. The base of the glacial series of the Elsterian is at 45 m above the present river level north of Bilzingsleben. Judging from the basic cycle model, it is probable that there is another interglacial sequence between 45 m and 35 m, a sequence which has, however, not been identified so far.

Three Middle Pleistocene terrace-travertine cycles were documented in the lower valley of the Wipper, below the Elsterian terrace. They can be correlated with three interglacials (Bilzingsleben I, II and III) alternating with glacial phases, during which sediments with indications of arctic conditions have been deposited. The upper cycle starts at 35 to 32 m and corresponds to a terrace in the valleys of the Saale, Ilm and Unstrut rivers, e.g. the terrace near Wangen,

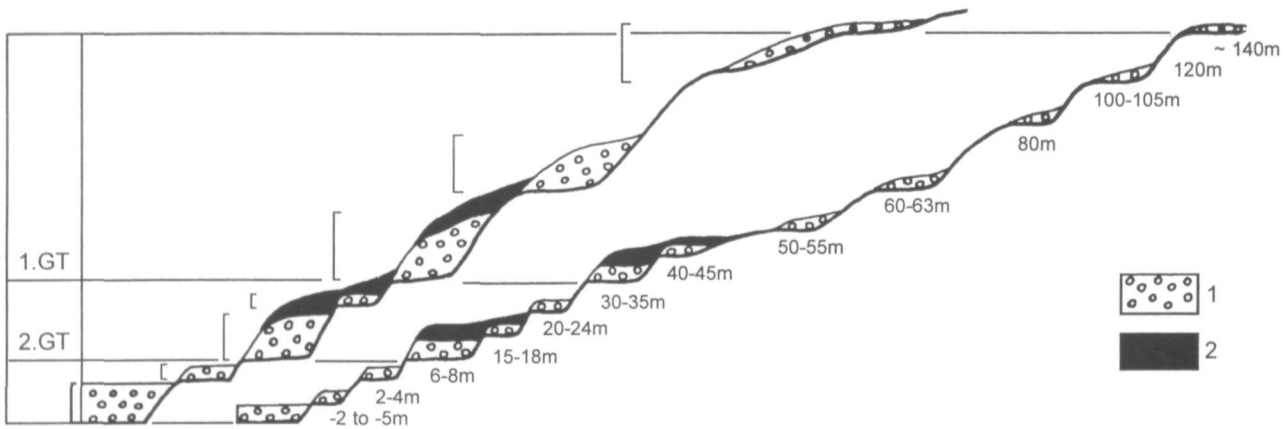

Fig. 2. Stratigraphy of the terraces in the regime of Saale river.
On the left: simplified sequence of the terraces stratigraphy, on the right: real sequence.
1. gravels; 2. glacial deposits (warved clays, groundmoraines).

with Palaeolithic artefacts. A lower terrace in the Saale-Unstrut region is called the *Corbicula* terrace because of the presence of a mollusc fauna with *Corbicula fluminalis* in the sandy-gravelly sections. These layers, at approximately 23 to 26 m above the actual river level, correspond to the middle of the three Middle Pleistocene cycles mentioned above. The so-called "Wallendorf terrace" in the Saale valley belongs to the latest of the three Middle Pleistocene cycles in the lower valley of the river Wipper near Bilzingsleben. The Wallendorf terrace is succeeded by a terrace formed during the Saale glaciation *sensu stricto*, situated at approximately 15 to 16 m above the actual river level. The glacial phase during which this latter terrace was formed was followed by an interglacial phase with which the travertine sequence of Ehringsdorf, the limnic-telmatic sequence of Neumark-Nord in the valley of the Geisel, and the Langenbogen soil complex have been correlated (Mania 1989; in press; Mania and Altermann 1970; Mania *et al.* 1990). The Warthe-Eem terrace-travertine sequence and the Weichselian and Holocene sequences are located below the terraces mentioned above.

3. Characteristics of the Middle Pleistocene 'Bilzingsleben' interglacials

3.1. The earliest interglacial deposits: "Bilzingsleben I"

A fluvial-limnic sequence covered by a travertine of several metres (Fig. 4) is situated on the 32 m terrace near Bilzingsleben. The sandy-gravelly sediments contain a *Theodoxus serratiliniformis* fauna. This river snail is related to *Theodoxus danubialis* found in the lower course of the Danube. *Corbicula fluminalis* has not been observed in the fauna so far. Apart from *Helicigona banatica*, the following Mediterranean and southeast European species occur: *Aegopis verticillus*, *Discus perspectivus*, *Pseudalinda turgida*, *Iphigena tumida*, as well as the Atlantic species *Azeca menkeana*.

Larger mammals, such as the straight tusked elephant *Palaeoloxodon antiquus* and the rhinoceros *Dicerorhinus kirchbergensis*, have also been recorded from the *Theodoxus* deposits. Furthermore there are some flint flakes from the Bilzingsleben *Theodoxus* gravels. The small assemblage from Wangen probably also dates to the 'Bilzingsleben I' interglacial, as well as the finds from Memleben in the valley of the Unstrut.

A *Helicigona banatica* fauna has been collected from the overlying sandy-silty parts of the fluvial deposits. *Helicigona banatica* is typical of travertine occurrences which have yielded *Corylus* and *Quercus*. In the synchronous sandy gravels of the Wangen terrace a *Palaeoloxodon antiquus* fauna occurred, along with an aquatic molluscan fauna without *Corbicula*.

3.2. The middle interglacial deposits: "Bilzingsleben II"

The "Bilzingsleben II" interglacial deposits consist of travertine deposits laterally interlaced with fluvial sands on top of the glacial 27 m-terrace. The sequence contains at its base the well-known Palaeolithic horizon of Bilzingsleben.

Corbicula fluminalis has not been found in the travertine of Bilzingsleben. The species, however, occurred in the synchronous river sands and gravels of the Wipper and the

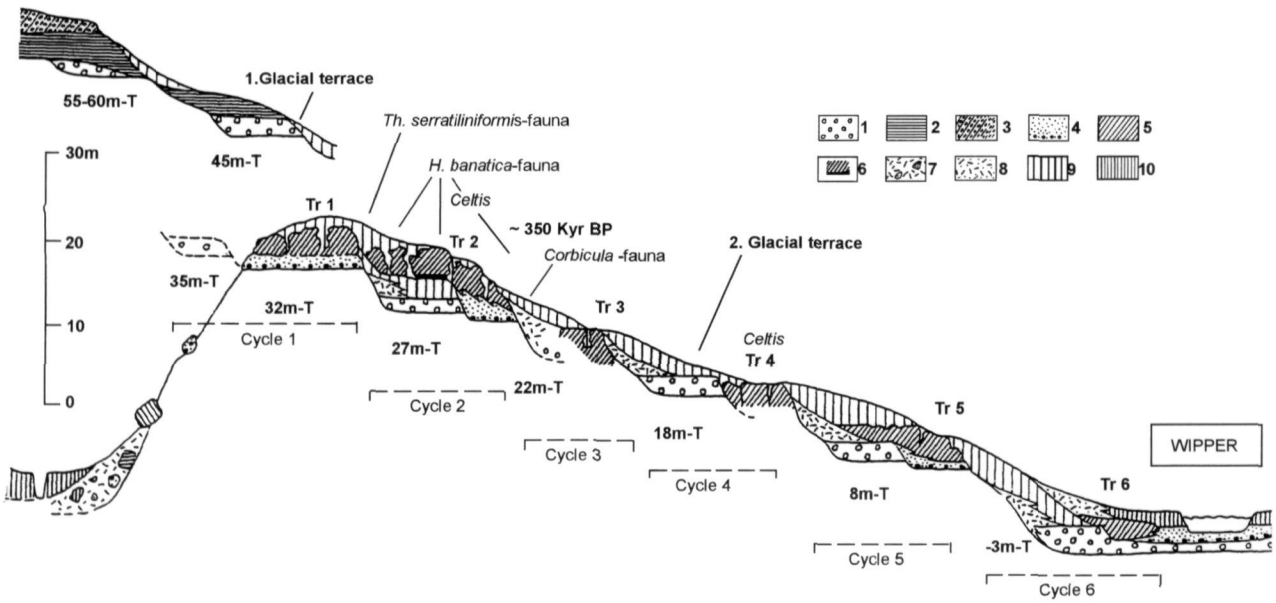

Fig. 3. Bilzingsleben. The sequence of the terraces and travertines in the Wipper valley.
1. gravels; 2. warves clay and silt ("Bänderton"); 3. boulder clay; 4. sandy gravels; 5. travertines; 6. palaeolithic horizon; 7. slope debris with material of solifluction; 8. deluvial loess and slope debris; 9. loess; 10. silts and loams.
T terrace, Tr 1-6 travertines.

Unstrut which are overlain by this travertine complex. *Theodoxus serratiliniformis* occurs occasionally in the archaeological find horizon. Species indicative of a wooded and a open environment are common in the molluscan fauna. Furthermore Mediterranean and southeast European species of the *Helicigona banatica* fauna are present, such as *Aegopis verticillus, Discus perspectivus, Iphigena tumida, I. densestriata, Truncatellina claustralis, Cepaea vindobonensis* along with Atlantic species *such as Azeca menkeana*. The smaller mammals are represented by stratigraphically important species such as the watervole *Arvicola terrestris cantiana* and the beaver *Trogontherium cuvieri*. *Palaeoloxodon antiquus* is well represented in the larger mammal fauna.

A study of the abundant floral remains showed the presence of a rich mixed oak-forest flora, more specifically a *Buxo-Quercetum, Buxo-Syringetum* and *Berberidion* association with many thermophile exotics such as *Buxus sempervirens, Pyracantha coccinea, Celtis australis, Syringa josikaea, Juniperus sabina, Vitis sylvestris* and other southern species. *Potentilla fructicosa*, a species with a more continental distribution, also occurs (Mai 1988).

The Bilzingsleben II travertine yielded the well known Bilzingsleben archaeological site with its numerous artefacts. Furthermore flint artefacts are known from the *Corbicula* gravels near Sachsenburg in the Unstrut/Wipper valley, not far from Bilzingsleben. The *Corbicula* gravels of the Wipper, Unstrut, Ilm, Geisel, Saale and Salzke rivers correspond to this travertine sequence. There are also finds from Neumark-Süd and Neumark-Nord in the Geisel valley (from the so-called Körbisdorf gravels), and from Köchstedt in the valley of the Salzke.

The rich find complex of Wallendorf, east of Merseburg, derives from the base of gravels deposited by the Saale river, just above denudation residues of reworked Elsterian glacigenous sediments. This complex is assigned to the transition of the interglacial to the Fuhne glacial phase. One flint flake comes from the basal layers of the loess which is overlain by the main archaeological horizon correlated to the travertine of Bilzingsleben II.

3.3. The later interglacial deposits: "Bilzingsleben III"

Another travertine discovered near Bilzingsleben is situated on the 22 m-level. The travertine differs distinctly from the older ones because of its lithology and its fossil content. The Bilzingsleben-III travertine contains a *Helix pomatia* mollusc fauna with exotic elements (*Aegopis verticillus, Discus perspectivus, Iphigena densestriata, Truncatellina claustralis*) along with components of a temperate

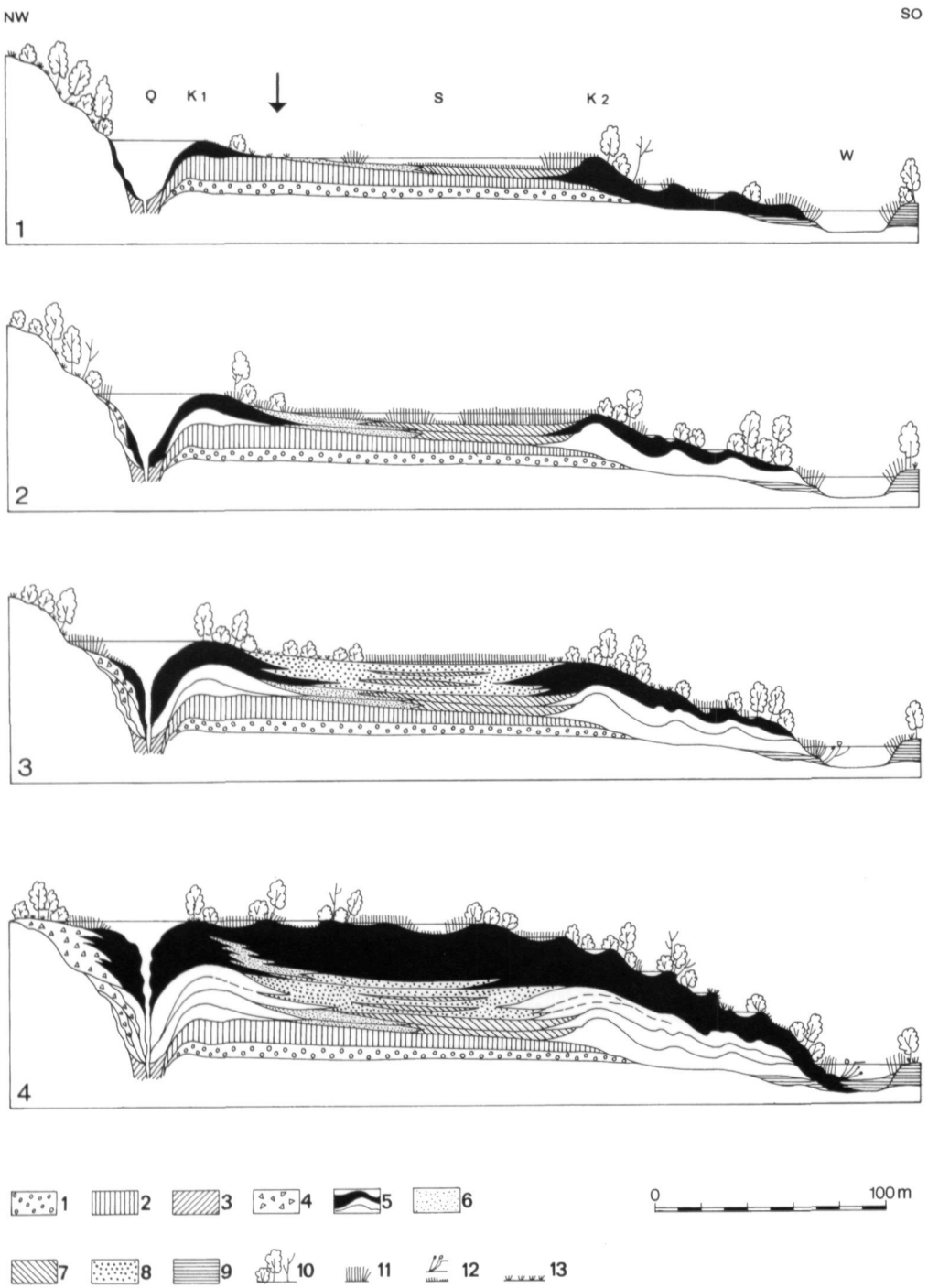

Fig. 4. Development of the travertine of the "Bilzingsleben II" sequence and its biotopes.
1. terrace gravel; 2. loess; 3. debris in the carstic spring; 4. slope debris; 5. travertine; 6. travertine sand; 7. lacustrine limestone; 8. loose travertine; 9. river sediments; 10. trees and shrubs; 11. Phragmites; 12. plants of aquatic biotops (Potamogeton, Nymphaceae, Charophytae); 13. Poaceae, Gramineae, herbs.
Q spring, K travertine cascade, S lake, W river (Wipper), the arrow refers to the position of the Palaeolithic living floor.

mixed forest (oak and hazel). Other south and southeast European representatives are: *Iphigena latestriata*, *I. tumida*, *Pagodulina pagodula*, *Valvata naticina*.

The limnic-telmatic deposits from the upper series of the Körbisdorf gravels in the Geisel valley (Mania and Mai 1969) and the slope debris soil complex of Lengefeld-Bad Kösen profile (Rudelsburg soil complex, Mania and Altermann 1970, new investigations cf. Mania 1989, 1990) are also indicative of the 'Bilzingsleben III' interglacial. A fully developed *Helicigona banatica* fauna associated with its particular *Azeca menkeana* fauna was found in the valley of the Geisel and in Lengefeld-Bad Kösen. A hornbeam-oak wood with Mediterranean and Pontic species (e.g. *Crataegus pentagyna*, *Prunus maheleb*, *Acer monspessulanum*, *Quercus pubescens*, *Azolla filiculoides*) was determined in the profile of the Geisel valley (Mania and Mai 1969). In the Rudelsburg soil-slope debris complex *Celtis* occurred.

3.4. Assignment

The latest Bilzingsleben interglacial (Bilzingsleben III) might correspond to the Dömnitz Interglacial (Cepek 1986; Erd 1973, 1978), which according to pollen analysis resembles the Wacken and the Schöningen Interglacial (Menke 1980; Urban *et al.* 1991). The middle Bilzingsleben interglacial (Bilzingsleben II) represents an older interglacial phase which does not correspond to the Holsteinian *sensu stricto* because of clear differences in the palynological record (K. Erd, pers. comm. 1993). The palynological picture shows similarities with that from the so-called Reinsdorf Interglacial deposits exposed in the browncoal-pit near Schöningen, which also contain artefacts. The pollen succession of the Reinsdorf Interglacial differs from the Holsteinian *sensu stricto* as well as from the succession of the Schöningen Interglacial because of a high amount of *Abies* pollen (Urban, in Thieme *et al.* 1993; Urban, in press).

The *Helicigona banatica - Helix pomatia - Azeca menkeana* fauna of the three Bilzingsleben interglacials represents apparently typical Middle Pleistocene features also recognised in other interglacial deposits of the "Holsteinian complex", e.g. in the travertine of Brüheim, Schwanebeck and Osterode near the "Fallstein" (cf. Mania 1973, 1983). These Middle Pleistocene faunas share the occurrence of the now extinct species *Acicula diluviana*.

A chronological indication was obtained by the ^{234}U-^{230}Th and ESR dates of the middle interglacial, the Bilzingsleben II deposits with the palaeolithic find horizon (see Schwarcz *et al.* 1988). The dates of 320 - 350 Kyr and 280 - 414 Kyr BP suggest a correlation of the Bilzingsleben II interglacial with OIS 11.

4. The Palaeolithic finds of the Middle Pleistocene

4.1. Wangen, near Nebra

Sandy gravels from the Unstrut, situated at 30 m above the level of the actual river, yielded a small series of approximately 50 flint artefacts (Lehmann 1922; Lehmann and Lehmann 1921; Toepfer 1961, 1968, 1960). The composition of the mollusc fauna and the remains of a *Palaeoloxodon antiquus* fauna indicate that the fluvial sediments were deposited during an interglacial phase. The finds consist of relatively small flakes, cores and tools. The pieces are 30-75 mm long (average size 50 mm). Some cores display a crude platform preparation. There are simple and double scrapers, along with pointed and transversal ones, while tools with crudely denticulated and notched edges occur. The hard hammer technique is manifested by thick flakes and obtuse flaking angles with an average value of 126.

4.2. Memleben, in the district of Nebra

A gravel layer, approximately 1 m thick, was exposed over a length of 35 m on a plateau on the southern side of the Unstrut valley. It was overlaying Early Pleistocene quartz gravels and covered by solifluction deposits several m thick. These consisted of reworked soil material derived from a Middle Pleistocene *Parabraunerde*. Borings showed the interfingering of the gravel with gyttjas and peats from a limnic sequence containing pollen and plant remains of a mixed hornbeam-oak wood as well as fruits of *Trapa natans* and *Vitis sylvestris* (Mai 1988; Mania 1984). Shells of *Theodoxus serratiliniformis* and an interglacial mollusc fresh water fauna were found in the two types of deposits.

In total, 104 flint artefacts were recovered here by Mania and G. Cubuk in 1975. They closely resemble those from Wangen. Here, too, there are cores and flakes manufactured with a hammerstone as well as tools. The flakes are relatively thick with flaking angles between 100-145°, and an average value of 123°. The artefacts are 25 to 108 mm long, with an average size of 52 mm. All cores are exhausted, and they display crudely prepared striking platforms, while the tools display a rough retouch. There are simple and double scrapers, a transversal scraper, and some denticulates and notched pieces (cf. Weber 1977).

4.3. Bilzingsleben, district of Artern (Bilzingsleben I)

Two simple flakes, 3 to 5 cm long, as well as a simple scraper (6 cm long) come from the *Theodoxus* gravels. All pieces were made of cretaceous flint and hard hammer struck.

4.4. Bilzingsleben, district of Artern (Bilzingsleben II, loess)

The terrace travertine sequence of the middle complex displays the following succession: Wipper gravels, 1 m thick, are situated on the 27 m level. Upwards, they pass over into a gravelly solifluction layer and then into loamy solifluction debris with limestone and dolomite blocks and isolated pebbles as well as frost structures. This 30 to 40 cm thick horizon is covered by reworked loesses, covered by a primary, aeolian loess. Several ice wedge generations were observed in this loess series, which is 3 to 4 m thick. After an erosional phase the loess was bleached by a pseudogley, then dissected by a brook. The interglacial travertine precipitation had already occurred in the channels of the brook, and an up to 6 m thick travertine profile subsequently developed on top of them.

At the base of the loess sequence, close to the solifluction horizon, a 5 cm thick grey humus layer contained a patinated flint flake.

4.5. Bilzingsleben, in the district of Artern (Bilzingsleben II, travertine)

At the base of the travertine dated to the middle Middle Pleistocene interglacial the Palaeolithic horizon is present. It rests on the loess surface, which has constituted the flat and horizontal surface of a shore terrace of a shallow lake, as well as the subsoil of the basin cut by the brook channels. Adjacent to the shore terrace, an alluvial fan composed of travertine sand was deposited from the west. The fan and the shore are the two types of facies containing the cultural remains, and are known in the literature on Bilzingsleben as the *Schwemmfächer* and the *Uferbereich* respectively.

The archaeological horizon is covered by a 60 cm thick *Chara* limestone, overlain by a complex travertine sequence several m thick.

More than 1000 m^2 of the main find horizon have been excavated so far. The finds seem to have been discarded at a location used as a home base by early humans, occupied for a substantial period of time during the warm-temperate maximum of the interglacial.

4.5.1. Palaeo-ecological setting

The camp site was situated on a shore terrace at the edge of a shallow lake fed by an ascending karst spring. Close to the site was the outflow of the source. To the west, behind it, the slope of the valley rose, and to the north-west, east and south-east the valley lowland spread. The prevailing vegetation of this area can be inferred from the floral remains: a light, dry oak wood, predominantly interspread by a thicket of *Buxus*. Meadows with scrubs of *Buxus sempervirens*, *Syringa josikaea*, *Pyracantha coccinea*, *Potentilla fructicosa*, *Corylus avellana*, *Swida sanguinea*, *Viburnum lantana* and other species are indicated too. *Cotoneaster integerrimus* and *Juniperus sabina* shrubs grew on the slopes of the valley. Dense mixed oak forests with *Taxus baccata* occurred in the narrow valley north of the site. In the valley, thickets of willow, reeds, meadow and swampy woods prevailed.

Judging from the floral and faunal remains, the climate was warm and relatively dry. The average temperature in January was -0.5° to +3°C, in July +20° to 25°C, with a yearly average of +10° to +11°C. Seven months showed average temperatures of more than +10°C. The annual precipitation was approximately 800 mm.

4.5.2. Vegetation

The most important types of vegetation were the *Buxo-Quercetum*, *Buxo-Syringetum* and *Berberidion* (Mai 1983, 1988, 1989). They contained mediterranean and South-East European species such as *Buxus sempervirens*, *Pyracantha coccinea*, *Celtis australis*, *Syringa josikaea*, *Juniperus sabina*, *Vitis sylvestris*, associated with the subcontinental species *Potentilla fructicosa*. Furthermore, the flora consisted of the following species: *Marchantia* sp., *Thelypteris thelypteroides*, *Taxus baccata*, *Picea abies*, *Quercus robus*, *Alnus glutinosa*, *Betula pubescens*, *Populus tremula*, *Tilia platyphyllos*, *Pyrus* sp., *Prunus avium*, *Prunus padus*, *Acer campestre*, *Acer pseudoplatanus*, *Fraxinus excelsior*, *Berberis vulgaria*, *Corylus avellana*, *Salix cinerea*, *Salix purpurea*, *Rubus* sp., *Cotoneaster integerrimus*, *Crataegus* sp., *Euonymus* sp., *Cornus mas*, *Swida sanguinea*, *Hedera helix*, *Rhamnus frangula*, *Viburnum lantana*, *Philadelphus coronarius*, *Peucedanum alsaticum*, *Galeobdolon luteum*, *Phragmires communis*, Cyperaceae, Gramineae, Bryophytae, Characeae (*Charites cava*) (Nötzold 1983).

4.5.3. Molluscan fauna

The characteristic association found in the archaeological horizon and travertine is the *Helicigona banatica* fauna with in total 90 species (Mania 1983). Thirty three of these are wood species. Besides *H. banatica*, other south and southeast European species occur: *Pagodulina pagodula*, *Discus perspectivus*, *Aegopis verticillus*, *Iphigena tumida*. Species of open terrain frequently occur, indicating the occurrence of light woods, forest steppes and open regions. Apart from common open ground species (*Pupilla muscorum*, *Vertigo pygmaea*, *Truncatellina cylindrica*, *Vallonia pulchella*, *V. costata*) southern steppe forms appear (*Truncatellina claustralis*, *Cepaea vindobonensis*, *Pupilla triplicata*). Among the aquatic fauna, *Theodoxus serratiliniformis* and the snail *Belgrandia germanica* living in sources prevail. The wood fauna is associated with the Atlantic species *Azeca menkeana*.

4.5.4. Ostracod fauna

As yet, 20 species have been determined (Diebel and Pietrzeniuk 1980). The occurrence of the semi-aquatic *Microdarwinula zimmeri*, today living in regions near the Equator, as well as a salt-water species, is noteworthy.

4.5.5. Vertebrate fauna

The species identified are mostly from the archaeological horizon. The great number of skeletal remains can be related to the hunting activities of early hominids, while the fish remains are also considered to be food refuse left by humans.

Pisces: *Silurus glanis*, *Tinca tinca* (Hebig 1983).

Amphibia/Reptilia: *Bufo bufo*, *Natrix natrix* (Böhme 1989).

Aves: *Haliaetus albicilla* (pers.comm. K. Fischer, Berlin).

Micromammalia: *Sorex araneus*, *Talpa* sp., *Castor fiber*, *Trogontherium cuvieri*, *Glis glis*, *Apodemus* sp., *Clethrionomys glareolus*, *Microtus arvalis/M. agrestris*, *M. subterraneus*, *Microtus* sp., *Arvicola terrestris cantiana*, (Heinrich 1989, 1991).

Other mammals are: *Canis lupus, Vulpes vulpes, Ursus deningeri-spelaeus, Meles meles, Felis silvestris, Panthera (Leo) spelaea. Macaca sylvana, Palaeoloxodon antiquus, Equus mosbachensis-taubachensis, Dicerorhinus kirchbergensis, D. hemitoechus, Sus scrofa, Dama* sp., *Cervus elaphus*, *Capreolus capreolus*, *Bos primigenius*, *Bison priscus*. The evidence of the occurence of *Bubalus murrensis* is questionable (Fischer 1991, Guenther 1991, Musil 1991a, Musil 1991b, Toepfer 1983).

A characteristic Middle Pleistocene *Palaeoloxodon antiquus* fauna is present.

4.5.6. The Palaeolithic finds from Bilzingsleben

Favourable conditions of preservation have preserved possible occupation structures and activity zones at the site. Awaiting the results of detailed taphonomic analyses of the site, we have already discerned several patterns within the find material, such as the foundations of three simple dwelling structures. In front of them, there were hearths and two to three workshops with anvils of stone or bone, with artefacts and fractured bones. Further away from the dwelling structures, we discern a workshop zone resembling the workshops found in front of the shelters. Within this zone, there is an oval paved area with a diameter of 9 m. It consists of pebbles and bone fragments of nut to fist-size. There were no objects found lying on top of this paved area. The distribution of specialised forms of tools, of debris related to the manufacture of the tools, as well as bone, antler, ivory and wood artefacts is an indication of the existence of other areas of specific activities. The alluvial fan stretching in from the shore-line contains the waste dump of the camp site. The camp site is assumed to have been the home base of a group of hominids for some time.

The artefacts (Fig. 5) are differentiated according to their functions. Large pebble tools were made of quartzite, limestone and crystalline rock (chopper, chopping tools, hammerstones). With small quartz hammerstones relatively small flint tools (8 to 100 mm long) were produced: knives, backed-knives ("Keilmesser"), scrapers, hand-axe shaped points, Tayac points, Quinson points, denticulates and notches. They are mainly edge retouched, but bifacial and unifacial retouches occur too. Large scrapers, backed knives, chisel-shaped tools and anvils were made of bone, while picks and club-like tools were manufactured from deer antlers. A great number of wood remains may represent artefacts: rod-like, hook- and spade-shaped forms occur. Some bone artefacts exhibit deliberately engraved sequences of lines (Mania and Mania 1988). The main source of food was constituted by large game, dominated by rhinoceros (Mania 1990; Mania and Weber 1986).

4.5.7. The hominid remains from Bilzingsleben

The comparative study of the abundant hominid remains by E. Vlcek demonstrated that the Bilzingsleben fossils largely resemble Olduvai Hominid 9, *Pithecanthropus* VIII and *Sinanthropus* III. This is also the case with the latest finds from Bilzingsleben such as G1, A3 and B7. For this reason, Vlcek attributed these fragments to the Middle Pleistocene form of *Homo erectus bilzingslebenensis* (Mania and Vlcek 1993; Vlcek 1978, 1986, 1991). All the hominid remains from Bilzingsleben, apart from one milk-molar, can be assigned to three different individuals.

4.6. SACHSENBURG, IN THE DISTRICT OF ARTERN

On the western edge of the Wipper-Unstrut valley gravels exposed in the seventies yielded a small series of flint artefacts. An interglacial molluscan fauna was also discovered there, with *Corbicula fluminalis* and *Theodoxus serratiliniformis*. The existence of a *Palaeoloxodon antiquus* fauna was inferred by bone remains and a tusk excavated there. Among the artefacts a polyhedric, crudely prepared core and some small flakes with obtuse flaking angles were present.

4.7. VALLEY OF THE GEISEL, IN THE DISTRICT MERSEBURG

Only a few artefacts were discovered in the lower part of the Körbisdorf gravels (Mania and Mai 1969). They were found in the brown-coal mine of Neumark-Süd and Neumark-Nord, i.e. within the last remnants of the Körbisdorf gravels, once exposed over several square km. These gravels were divided into two sequences each consisting of interglacial sandy gravels with an overlying glacial gravel

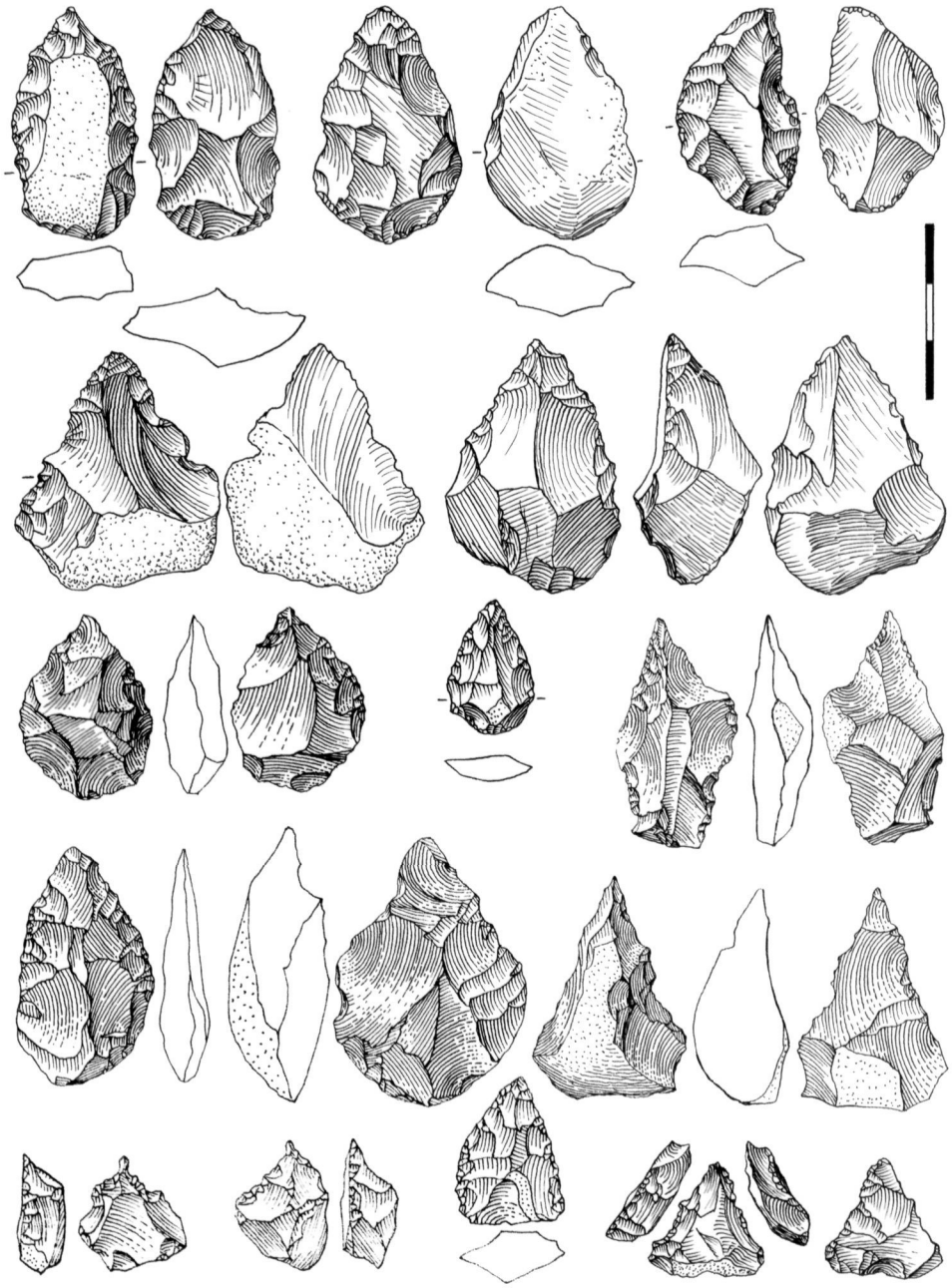

Fig. 5. Bilzingsleben: flint artefacts. Scale in cm.

cover. The sequences were separated by an erosional level area and loesses containing an arctic molluscan fauna. A molluscan fauna with an abundant occurrence of *Corbicula fluminalis* was recovered in the sandy gravels of the lower series, together with common interglacial fresh water species, some thermophile wood species and predominantly species of open terrain. Among the mammal fossils remains of *Palaeoloxodon antiquus*, *Equus* sp., *Dicerorhinus kirchbergensis*, cervids and bovids were identified. Decades ago oak trunks, pine cones and other plant remains were repeatedly observed in this horizon when the layers covering the brown-coal were removed by the mining companies. Unfortunately, these exposures were never systematically studied.

Alluvial peats and travertines were present in the interglacial fluvial sediments of the upper series, yielding a rich *Helicigona banatica* fauna, remains of a *Palaeoloxodon antiquus* fauna as well as fruits and seeds indicative of Mediterranean-subcontinental hornbeam-oakwoods as well as dry oakwoods (Mania and Mai 1969). The well-known artefacts from the *Corbicula* sands are made of flint. They consist of a small exhausted disc-shaped core and some small flakes. A chunk shows a notched edge produced by a powerful blow.

4.8. Köchstedt, in the district of Eisleben

At several locations in the valley of the Salzke in the eastern Harz foreland, Middle Pleistocene gravels were exposed, mostly consisting of two fluvial series, like in the valley of the Geisel. The upper part was a gravel layer accumulated during a cold phase, generally interpreted as the early Saale glacial. It contained a *Mammuthus* fauna with *Mammuthus trogontherii*/*M. primigenius* and *Coelondonta antiquitatis* as well as several ice wedge generations. The lower part was a sandy gravel belonging to the *Corbicula* horizon. It was overlain by a net of ice wedges and solifluction deposits with cryoturbations, an indication of another glacial (Fuhne glacial). *Corbicula fluminalis* occurred with salt water forms such as the snail *Hydrobia stagnorum* and the salt water ostracode *Cyprideis litoralis*, *Heteocypris salinus* and *Candona angulata*. Other elements of the fauna are interglacial aquatic forms, species of bogs and of various moist biotopes, lowland wood species and some thermophile mixed wood species (species of a *Helicodonta obvoluta-Chochlodina laminata* fauna, Mania 1973). Vertebrate remains are represented by *Palaeoloxodon antiquus*, *Dicerorhinus kirchbergensis*, *Castor fiber* and *Esox lucius* (cf. Mertin 1940).

The small series of artefacts contains flint flakes, similar to those from Wangen, Memleben and Wallendorf (Toepfer 1961, 1968, 1970).

4.9. Wallendorf, in the district of Merseburg

The base of the so-called Wallendorf terrace located at the eastern edge of the Saale valley is approximately 10 m above the early Saale glacial level and is dated to the Fuhne glacial (Ruske 1964, 1965). For the greater part, the gravel cover, with a thickness of 5 m, consists of material accumulated during a cold phase, as shown by the composition of its mollusc fauna and by frost structures in its upper part. The basal layers of the gravel contain mollusc associations of a cool temperate climate, and *Palaeoloxodon* remains. This indicates that the basal sandy gravels were deposited during the transition of the late interglacial to the early glacial. Artefacts found in this part of the section were, without any exception, manufactured from baltic flint. Approximately 1000 objects are present (Mania 1984, 1988; Toepfer 1961, 1968, 1970). The denudation residue of the Elsterian glacigenous sediments at the base of the gravel seems to have been the source of the raw material, as it contains a large number of large flint nodules. The artefacts might represent the remains of workshops once situated at the bottom of the valley. Approximately 75% of the artefacts consist of flakes, 23% of cores and only 2% are tool pieces with retouche. Small preparation and retouch debris was not collected, so larger flakes dominate, with sizes between 35 and more than 100 mm, and an average value of approximately 60 to 70 mm. The cores reach sizes of more than 150 mm, but more than 80% are smaller than 85 mm, mostly exhausted exemplars. Most flakes are short and thick, irregularly shaped with their cortex often not yet removed. They have large flaking angles (95° to 150°, average value 125°) and well pronounced bulbs of percussion. Levallois cores as well as prepared cores used for the production of blades also occur, as do flakes from such cores. Only a few flake tools are present, mostly scrapers. Some flakes have notched or denticulated edges. Some crudely flaked tools resemble roughouts of handaxes.

4.10. Schöningen, in the district of Helmstedt

The locality Schöningen (Thieme *et al.* 1993) is situated in the northern region of the sub-herzynic basin north of the Harz mountains. It is located in a NW-SE channel which follows the southern edge basin of the Straßfurt-Helmstedt salt saddle. After suberosion the channel changed into a shallow swampy lake in which a sequence of 8 m sediment has been deposited. The sequence consists of five series with at the base limnic sediments which transfer into low-lying peats and swampy soils.

The interglacial deposits in which the site Schöningen 12 is located lie on top of the Elsterian glacial deposits – ground moraine and melt water sediments – and are covered by the glacial series of the Saalian glaciation *sensu stricto*.

Studies of the floral and faunal remains indicate that the lower sequence dates to a fully developed warm temperate climatic phase, the Reinsdorf Interglacial (Urban, in Thieme *et al.* 1993; Urban, in press). Two archaeological horizons were discovered in the littoral sediments of the sequence of gyttja and peats: a lower one lying in a flat alluvial fan of gyttja sands and an upper one in swampy and peat sediments 2 to 3 m higher in the sequence.

4.10.1. Vegetation

Pollen analyses by B. Urban yielded four vegetation phases for the lower sequence:

- phase 1a: mixed oak-pine wood period (with *Azolla filiculoides*),
- phase 1b: mixed oak-linden-pine wood period,
- phase 2: alder-hazel period,
- phase 3: hornbeam-pine-spruce-fir period (with *Pterocarya* and *Celtis*).

Archaeological find horizon 1 belongs to the transitional period of phase 2 and 3, findhorizon 2 to the final stage of phase 3.

The filling up of the lake led to the spread and abundant occurrence of the alder tree; alder bogs developed. Pine and birch trees rapidly increase in the sequences overlying the archaeological horizons. Indications of late interglacial conditions appear after a long hiatus caused by the filling up of the lake. A first early glacial interstadial is probably represented in the peat of the upper fourth sequence.

4.10.2. Molluscan fauna

A thermophilous fauna rich in species with Mediterranean and southeast European elements similar to the *Helicigona banatica* fauna has been recorded from the Reinsdorf (Schöningen 12) Interglacial deposits. However, *Helicigona banatica* has not yet been identified. The northwestern edge of the distribution of the species is approximately 15 to 20 km south-east of Schöningen, in the Middle Pleistocene travertines of Schwanebeck am Huy and the travertines of Osterode am Fallstein. Important exotic species in the Schöningen 12 fauna are *Aegopis verticillus*, *Pagodulina pagodula*, *Iphigena densestriata*, *Cochlodina costata* and *Vitrea subrimata*, and the meridional species *Truncatellina claustralis*. All these species characterise the climatic maximum as markedly warm temperate with Mediterranean influence. The average annual temperatures were approximately 2 to 3 degrees higher than at present. In the molluscan fauna there is a relatively high proportion of species which are indicative of open terrain – in contrast to the closed vegetation indicated by the pollen analysis. The molluscan fauna indicates a relatively dry climate and open woods in the surroundings of the site.

In the upper sequence, more warmth demanding elements are missing. In particular, associations indicative of a cool temperate phase and with a higher percentage of species which inhabit open terrain, occur. Molluscs have not yet been determined from the fourth sequence. Higher upwards arctic swampy loess and loess associations (Fuhne glacial?) already appear.

4.10.3. Mammalian fauna

Vertebrate remains of fish, reptiles, amphibians, birds and mammals are well represented in the interglacial deposits.

The mammal fauna identified by T. van Kolfschoten, consists of the following species: *Sorex minutus*, *Sorex* sp. (*S. araneus* group), *Desmana* sp., *Trogontherium cuvieri*, *Castor fiber*, *Lemmus lemmus*, *Clethrionomys glareolus*, *Arvicola terrestris cantiana*, *Microtus subterraneus*, *M. arvalis/M. agrestis*, *M. oeconomus*, *Apodemus* sp. The smaller mammal fauna is a typical *Arvicola terrestris cantiana-Trogotherium cuvieri* association, also described for Bilzingsleben.

A diverse larger mammal fauna with: *Ursus* sp., Mustelidae, *Elephas (Palaeoloxodon) antiquus*, *Dicerorhinus kirchbergensis*, *Equus* sp., *Sus scrofa*, *Cervus elaphus*, *Capreolus capreolus* and *Bos/Bison* has been collected as well. Remains of bovids and wild horses prevail among the fauna hunted.

4.10.4. Culture

The excavated artefacts have not yet been studied by H. Thieme in full detail. Artefacts (Fig. 6) manufactured of baltic flint, with a morphology resembling those from the site of Bilzingsleben, prevail. Flakes, flaking debris and a few simple cores were found. Some hammerstones of small quartz and quartzite pebbles are present. Among the tools denticulates and notches prevail. Additionally, heavy-duty small scrapers as well as flakes with convex retouched edges, Quinson and Tayac points occur. A large core was used as a chopping tool. There are some indications that wooden artefacts might be preserved at the site, while some evidence of fire is present too.

5. Conclusion

The oldest Palaeolithic finds from the Elbe-Saale region date to the period between the Elsterian and the Saalian glaciation (Holstein complex) (Table 1). Recent investigations show that this period can be divided into three interglacials. The travertine segments connected with former valley bottoms and terraces are a strong evidence for this at Bilzingsleben. It is likely that Bilzingsleben III is identical with the Dömnitz Interglacial, the Holsteinian corresponding either to Bilzingsleben I or to Bilzingsleben II.

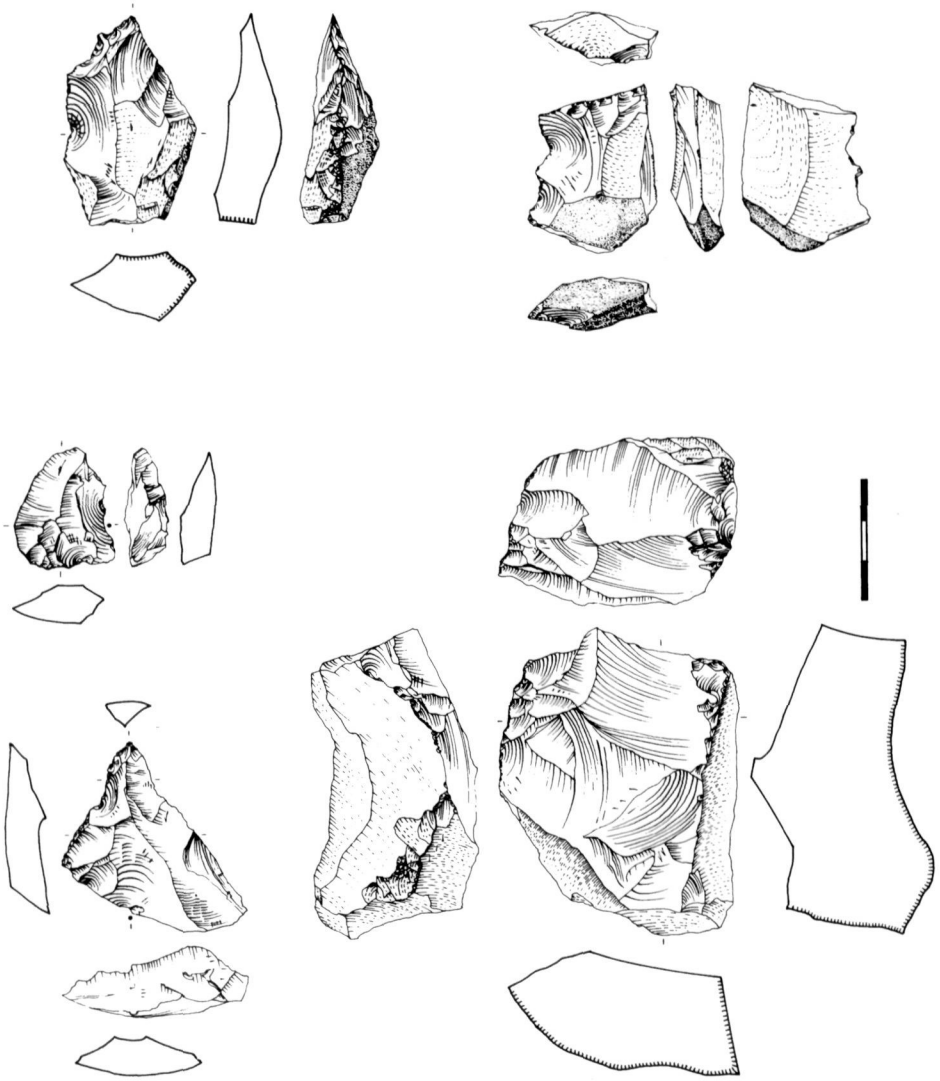

Fig. 6. Schöningen - Reinsdorf Interglacial deposits, flint artefacts. Scale in cm.

The glacials between these interglacials were characterised by arctic conditions. The glacial between Bilzingsleben II and Bilzingsleben III corresponds to the Fuhnian. All these Middle Pleistocene interglacials are characterised by particular small vertebrate, molluscan and floral associations (*Arvicola terrestris cantiana-Trogontherium cuvieri*-association, *Helicigona banatica*-association containing *Azeca menkeana*, a flora with Mediterranean and subcontinental elements: *Buxus*, *Syringra*, *Celtis* and others).

The most important archaeological find horizon is situated in the middle travertines (Bilzingsleben II) of Bilzingsleben, evidence enough to abandon its former attribution to the Dömnitz Interglacial. According to radiometric dates this travertine is 350 to 400 Kyr old. On the ground of morphological features, the hominid remains excavated there are assigned to a late representative of *Homo erectus*. The excavations brought to light a camp site with different structures and find associations (activity zones).

Table 1. Stratigraphical scheme.

	Stratigraphy of Bilzingsleben and Saale Region	Glacial deposits	Interglacial deposits	characteristics	Palaeolithic sites
Saalian Complex	Glacial (Warthian)	Loess 5-8m terrace			
	Interglacial		Bilzingsl. IV 14m level	Celtis Helix-fauna	Neumark-Nord Ehringsdorf
	Glacial (Saalian / Drenthian)	*Glacial Series Loess* 15-18m terrace			Markkleeberg Eythra (Leipzig)
Holsteinian Complex	Interglacial (Dömnitz-Int.)		Bilzingsl. III 20m level	Celtis Helix-fauna	
	Glacial (Fuhne-Glacial)	Loess 22m terrace			Wallendorf
	Interglacial		Bilzingsl. II 26m level 320-412 Kyr BP	Celtis Banatica-fauna Corbicula-fauna	Neumark-Süd Bilzingsleben Sachsenburg Köchstedt
	Glacial	Loess 27m terrace			
	Interglacial (Holstein-Int.)		Bilzingsl. I 32m level	Celtis Banatica-fauna Theodoxus-fauna	Wangen Memleben
Elsterian Complex	Glacial (Elster II?)	Glacial Series II ? 35m terrace			
	Interglacial ?				
	Glacial (Elster I or Elster I+II?)	Glacial Series I (+II?) 45-50m terrace			

Along with coarse pebble tools, relatively small sized specialised tools of flint appeared. Additionally, artefacts of bone, antler, ivory and wood were excavated.

A small artefact assemblage of sandy gravels from the Unstrut valley near Wangen is placed into the earlier interglacial. The inventory of Memleben seems to be of the same age. All these artefacts resemble the Bilzingsleben material. This is also true for the artefact finds from the Reinsdorf interglacial from Schöningen in the Nordharzvorland. At Schöningen, there is apparently a similar sequence to that found in Bilzingsleben with three interglacials.

The flint artefacts coming from the Saale gravels of Wallendorf are attributed to the middle Acheulean. They derive from the transitional period of the middle interglacial to the Fuhne glacial. The large Acheulean complex of Markkleeberg dates from the latest part of the Middle Pleistocene interglacial sequence and belongs to the early part of the Saale glacial.

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