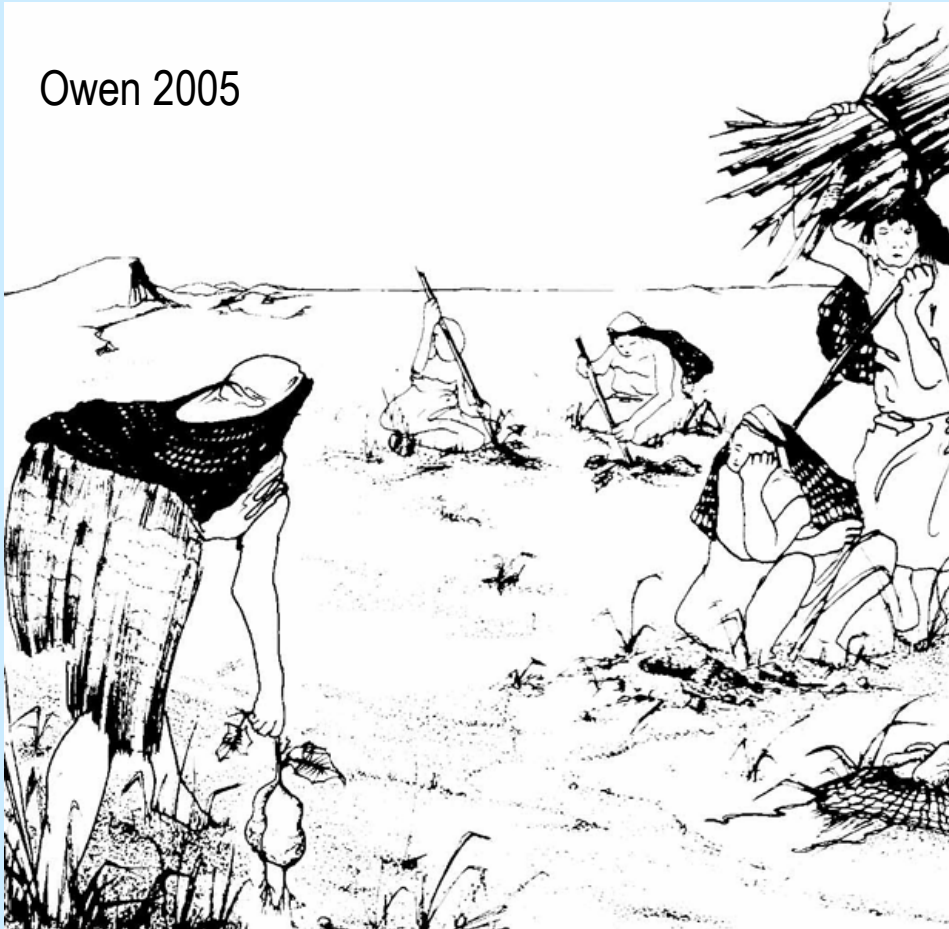


# Pflanzennutzung durch JägerInnen- / SammlerInnenkulturen

Owen 2005



Paläolithikum  
Mesolithikum

Literaturangaben S. 31

# Altpaläolithikum: Acheuléen, vor rund 750'000 Jahren



## Evidence of Hominin Control of Fire at Gesher Benot Ya'akov, Israel

Naama Goren-Inbar,<sup>1\*</sup> Nira Alperson,<sup>1</sup> Mordechai E. Kislev,<sup>2</sup>  
Orit Simchoni,<sup>2</sup> Yoel Melamed,<sup>2</sup> Adi Ben-Nun,<sup>3</sup> Ella Werker<sup>4</sup>

The presence of burned seeds, wood, and flint at the Acheulian site of Gesher Benot Ya'akov in Israel is suggestive of the control of fire by humans nearly 790,000 years ago. The distribution of the site's small burned flint fragments suggests that burning occurred in specific spots, possibly indicating hearth locations. Wood of six taxa was burned at the site, at least three of which are edible—olive, wild barley, and wild grape.

## Gesher Benot Ya'akov (GBY): Situation, Stratigraphie, Datierung



The archaeological site of Gesher Benot Ya'akov (GBY) which translates from Hebrew as "Bridge of the Daughters of Jacob", located on the banks of the Jordan River in the Dead Sea Rift of northern Israel. Exposures of the artifact-rich layers can be seen along the river's edge.



Profile of one of the archaeological layers at GBY. These tilted layers were once part of the beach along the ancestral Hula Lake, where early humans dropped handaxes, flakes and cores, which can be seen in this profile.

Um 780'000 – 790'000 Jahre vor heute; Homo erectus; Feuchtbodenerhaltung!



GBY (3)

Jagd nachgewiesen



Ausgrabung

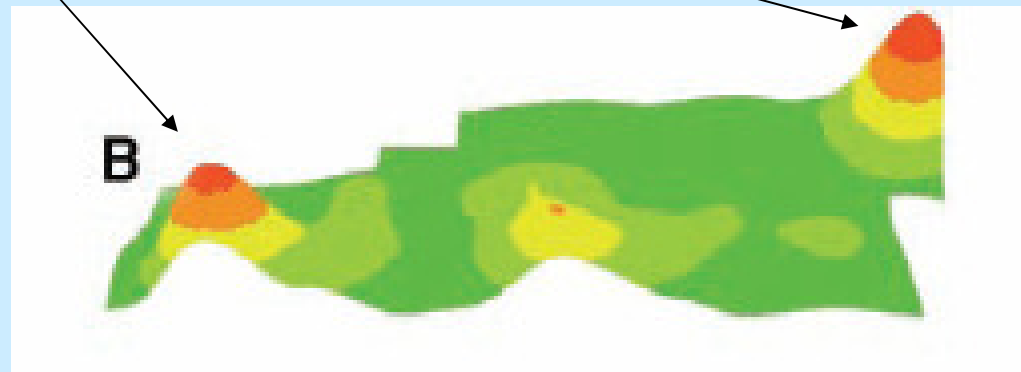
A butchered **elephant skull** found in association with wooden log and basalt artifacts and their interpretation (on exhibition at the Israel Museum, Jerusalem).

# Besonderheit in GBY: Nachweis des Gebrauches von Feuer!!!



- Viele durch Feuereinwirkung verfärbte Silex-Artefakte
- Diese liegen konzentriert an bestimmten Stellen vor (➡ Feuerstellen!)

Schicht V-5,  
“verbrannte”  
Silexartefakte  
(Funddichten)



“Same” eines Grases (mit Getreide verwandt)

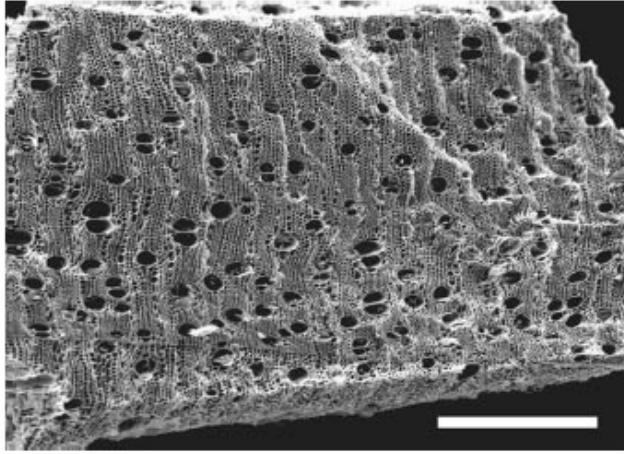


Fig. 2. Cross section of burned *Olea europaea* subsp. *oleaster* (wild olive) specimen. Wood is diffuse porous; vessels are solitary and in short radial multiples. Bar, 0.5 mm.

Olivenholz (Wilde Olive), dazu  
reichlich Esche (*Fraxinus*  
*syriaca*)

Verkohlte Pflanzenreste von GBY

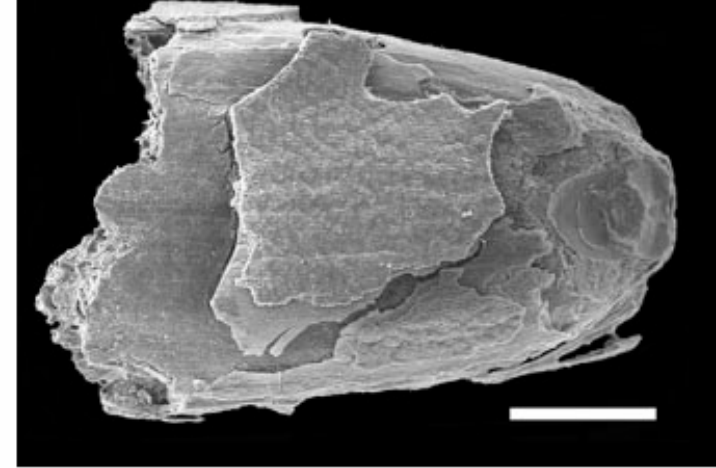
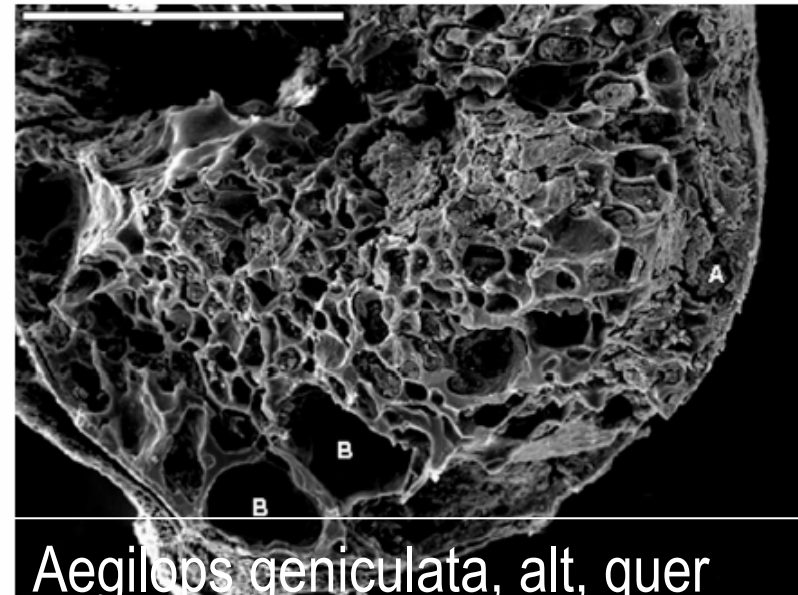


Fig. 3. Burned grain of *Aegilops* cf. *geniculata*: dorsal view of a basal fragment (this grain is also shown in fig. S2). Parts of husk and embryo are clearly seen. Bar, 1 mm.



*Aegilops geniculata*, alt, quer



# Verkohlte Pflanzenreste aus GBY

**Table 2.** Stratigraphic assignment, botanical identification, and size and number of burned wood and fruit specimens at GBY. The layers are presented in stratigraphic order.

Layer	Plant taxon (and identified part)	Common name	Maximum length (mm)	No. of specimens
V-6	<i>Periploca graeca</i> (wood)	Greek silk-vine	6.0	1
V-6	<i>Salix/Populus</i> (wood)	Willow/poplar	4.0	1
VI-10	<i>Avena</i> sp. (awn)	Oat	2.4	1
II-5/6	<i>Fraxinus syriaca</i> (wood)	Syrian ash	3.5–6.3	2
II-5/6	<i>Olea europaea</i> (wood)	Wild olive	6.0	1
II-5/6	<i>Vitis sylvestris</i> (wood)	Wild grape (vine)	4.7	1
II-6 L1	<i>Fraxinus syriaca</i> (wood)	Syrian ash	3.0–12.0	17
II-6 L1	<i>Olea europaea</i> (wood)	Wild olive	4.0–7.5	3
II-6 L1	<i>Periploca graeca</i> (wood)	Greek silk-vine	4.0	1
II-6 L1	<i>Prosopis?</i> (wood)	Mesquite	6.0–10.0	2
II-6 L1	<i>Vitis sylvestris</i> (wood)	Wild grape (vine)	6.0	1
II-6 L1	Unidentified (wood)		11.0	1
II-6 L2	<i>Fraxinus syriaca</i> (wood)	Syrian ash	4.7	1
II-6 L2	<i>Galium</i> sp. (fruitlet)	Bedstraw	1.9	1
II-6 L2	Unidentified (wood)		6.0	1
II-6 L4	<i>Galium</i> sp. (fruitlet)	Bedstraw	2.9	1
II-9	<i>Hordeum spontaneum</i> (grain)	Wild barley	3.2	1
II-11	<i>Aegilops geniculata/peregrina</i> (grain)	Goatgrass	5.7	1
II-11	<i>Stipa bromoides</i> (grain)	Sharp-awned feather- grass	2.9	1
III-7	Poaceae (awn)	Grass	1.2	1
III-9	<i>Aegilops</i> cf. <i>geniculata</i> (grain)	Ovate goatgrass	2.9	1

Holz

Gräser!

## Nuts, Nut Cracking, and Pitted Stones at Gesher Benot Ya'aqov, Israel

Naama Goren-Inbar; Gonen Sharon; Yoel Melamed; Mordechai Kislev

*Proceedings of the National Academy of Sciences of the United States of America*, Vol. 99, No. 4. (Feb. 19, 2002), pp. 2455-2460.



The Acheulian site of Gesher Benot Ya'aqov (Israel) has revealed a unique association of edible nuts with pitted hammers and anvils. Located in the Dead Sea rift, on the boundary between the Arabian and African plates, the site dates to the Early-Middle Pleistocene, oxygen isotope stage 19. In a series of strata, seven species of nuts, most of which can be cracked open only by a hard hammer, were uncovered. Five of the species are extant terrestrial nuts, and two are aquatic nuts now extinct in the Levant. In addition, the site yielded an assemblage of pitted hammers and anvils similar in pit morphology to those used by chimpanzees and contemporary hunter-gatherers. This is the first time, to our knowledge, that a site has offered both paleobotanical and lithic evidence of plant foods eaten by early hominins and technologies used for processing these foods. The evidence also sheds light on the structure of the community: ethnographic analogies suggest that mixed-gender groups may have been active on the shores of paleo-Lake Hula.



**Table 1. Stratigraphic distribution of nuts and pitted stones at GBY**

Layer	<i>E. ferox</i>	<i>P. atlantica</i>	<i>Quercus</i> sp.	<i>T. natans</i>	Pitted stones
"Unconformity"*					3
VI-2				4	
V-5 <sup>†</sup>					1
V-5/6 <sup>†</sup>				1	2
V-6 <sup>†</sup>					1
VI-3				1	
VI-4				9	
VI-5				2	
VI-6				2	
I-4	1			10	
VI-7				3	
VI-8				1	
VI-9				1	
VI-10	3			2	
II-2	9			4	
II-2/3 <sup>†</sup>	15			20	
II-3	2		2	2	
VI-12 <sup>†</sup>	1			1	
II-5	17		1	16	
II-5/6 <sup>†</sup>	13		5	36	1
II-6 <sup>†</sup>	221		28	111	46
II-7 <sup>†</sup>			2	16	
IV-7		1	5	3	
II-8			1	2	
II-9	1		11	29	
II-10				1	
II-11	3		3	6	
III-4				1	
III-5	5			1	
III-6				1	
III-7	19			26	
III-9				2	
III-11			1		
Total	310	1	59	321	54

Nut frequencies refer to minimum number of nuts.

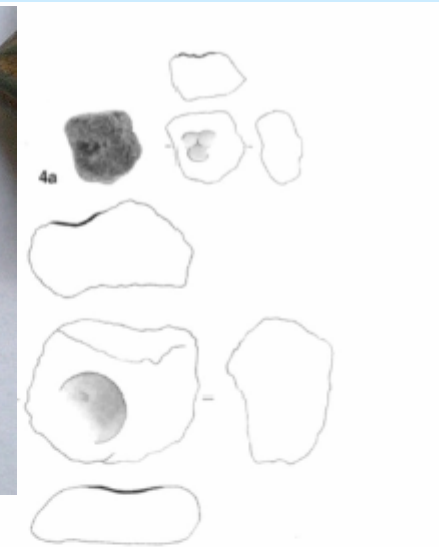
\*The contact zone between the Middle Pleistocene and the Holocene.

<sup>†</sup>Archaeological horizon.

## GBY: Nüsse und "pitted stones"



Wassernuss  
(*Trapa natans*)



**Fig. 2.**  
cobble  
"Unconformity"  
(4) Small deep pit on basalt flake (layer II-6 L 4b). (4a) Cluster of small deep pits on angular basalt fragment (layer II-6 L 4b).

# Saisonalität ?

Species	Type	Length, width, thickness in millimeters	Ripening season
<i>Amygdalus communis</i>	Nut	22 ´ 15 ´ 13*	July–August <sup>§</sup>
<i>Euryale ferox</i>	Seed	10 ´ 9 ´ 9*	July–August <sup>¶</sup>
<i>Pistacia atlantica</i>	Nutlet	5 ´ 6 ´ 4*	July–September <sup>¶</sup>
<i>Pistacia vera</i>	Nut	23 ´ 11 ´ 11 <sup>†</sup>	July–September <sup>**</sup>
<i>Quercus calliprinos</i>	Acorn	23 ´ 12 ´ 12*	December <sup>††</sup>
<i>Quercus ithaburensis</i>	Acorn	41 ´ 18 ´ 18*	October–November <sup>††</sup>
<i>Trapa natans</i>	Prickly nut	36 ´ 20 ´ 20 <sup>‡</sup>	June–September <sup>‡‡</sup>

Juni – Oktober wahrscheinlich!

# Gelangten die Reste tatsächlich durch anthropogene Tätigkeit in die Schichten?

- Wurde sorgfältig analysiert und diskutiert
- Funde repräsentieren nicht eine typische, repetitive taphonomische Sequenz → eher anthropogener Ursprung
- Eine natürliche Ablagerung kann aber nicht 100%ig ausgeschlossen werden

# Mittelpaläolithikum 200'000 – 35'000 BP

Mousterian vegetal food in Kebara Cave, Mt. Carmel

Efraim Lev<sup>a, \*</sup>, Mordechai E. Kislev<sup>b</sup>, Ofer Bar-Yosef<sup>c</sup>

Journal of Archaeological Science 32/3, 2005, 475-484

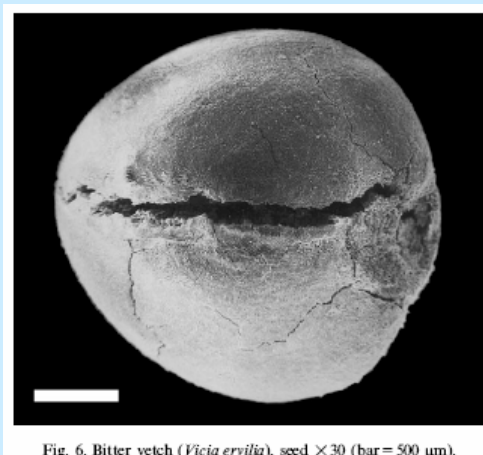
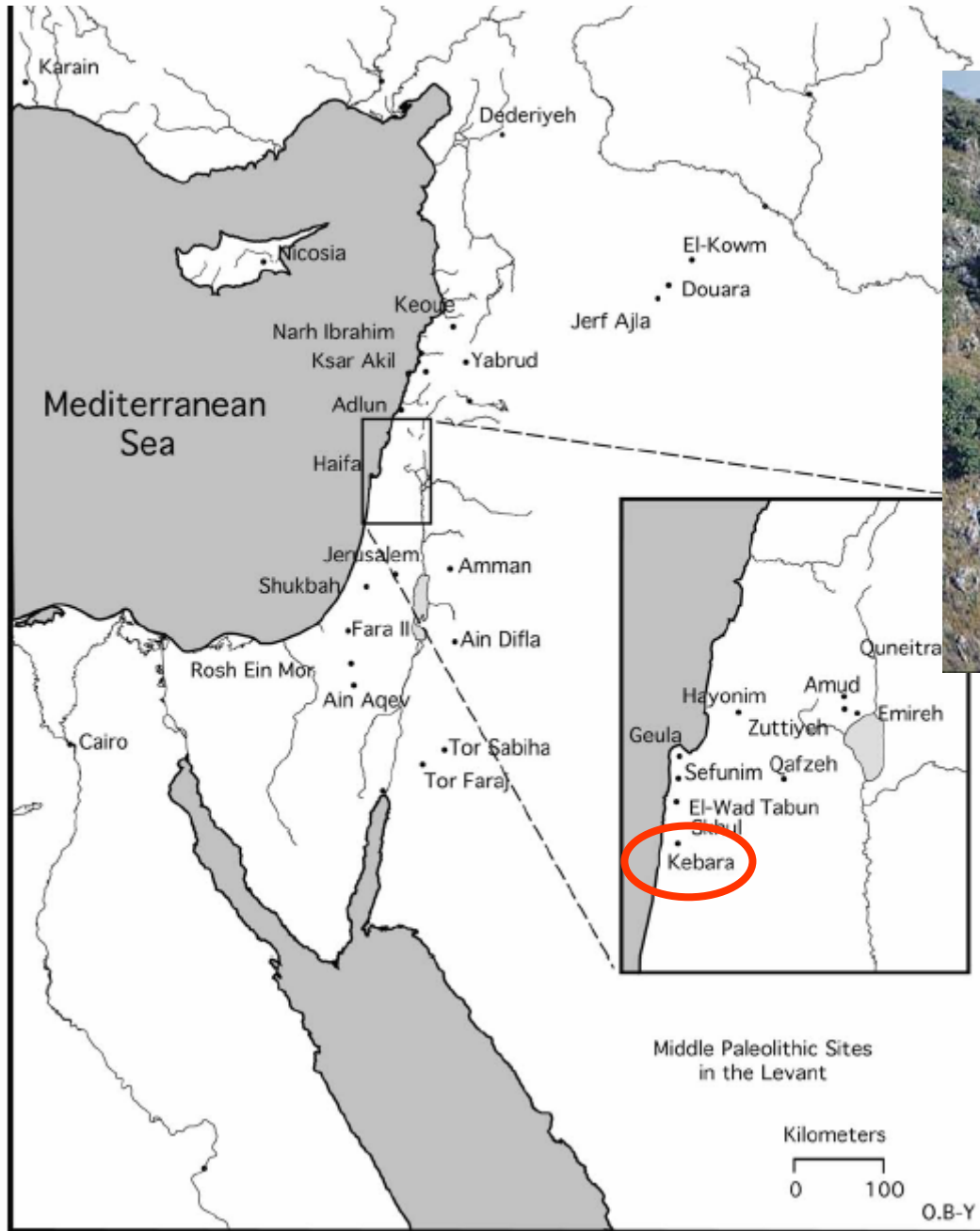


Fig. 6. Bitter vetch (*Vicia ervilia*), seed  $\times 30$  (bar = 500  $\mu\text{m}$ ).



Fig. 1. Kebara cave location among other Middle Paleolithic sites in the Near East [5]. 1, El Kowm; 2, Douara; 3, Jerf Ajla; 4, Keoue; 5, Nahr Ibrahim; 6, Ksar Akil; 7, Yabrud; 8, Adlun; 9, Shukbah; 10, Fara II; 11, Rosh Ein Mor; 12, Ain Aqev; 13, Ain Difla; 14, Tor Faraj; 15, Tor Sabiha.



## Kebara Höhle

Mittelpaläolithische  
Fundstellen im Nahen Osten

# Kebara Höhle: Datierungen

Table 1

The Mousterian stratigraphic units in Kebara cave, their average TL dates [58], and provenience (1-m grid square) of plant remains

Units	Years BP squares with plant remains
VI	48,300 ± 3500
VII	51,900 ± 3500 H21, J21, M22, M23, M24, N24, O24, O26, P20, P26
VIII	57,300 ± 4000 K16, K18; K21, L21, M21, M22, N21, N22, N24
IX–X	58,400 ± 4000 to 61,600 ± 3600 J21, K16, K17, K18, K21, L19, L21, M16, M17, M19, M21, M24; M26, N21, N24; Q17
X	61,600 ± 3600 H19, I19, J19
XI	60,000 ± 3500
XII	59,000 ± 3500



Teilskelett eines  
Neanderthalers, gefunden  
1982, datiert auf rund 60'000  
Jahre vor heute

Kebara-Höhle

Mittelpaläolithische  
Schichten mit Feuerstellen!

# ARCHÄOBOTANIK: Methoden

- Es wurde während der Grabung geschlämmt (Flotation)
- Total **900 l** von 120 m<sup>3</sup> Erdmaterial flотиert
- Aus **jedem** ausgegrabenen Quadranten von 50 x 50 x 5 cm **1-2 l** Material geschlämmt



# ARCHÄOBOTANIK: Ergebnisse

- Viele **verkohlte Pflanzenreste**, v.a. im Bereich der Feuerstellen!
- **4205** verkohlte Samen/Früchte, davon 3956 bestimmbar (Funddichte fast **5 Stk/Liter!**)
- Davon 3313 = 78,8% **Leguminosen!**

Kebara-Höhle

Table 2

Mousterian plant remains from Kebara Cave (after [30], Latin names after [10], common names after [13])

Latin name	Family	No. of seeds	Common name/figure no. ()/Stratigraphic or unit //optional medicinal uses *
<i>Aegilops geniculata/peregrina</i>	Gramineae	2	Ovate goat-grass [VII, X]
<i>Astragalus echinus</i>	Papilionaceae	1	Milk-vetch [IX-X]
<i>Avena barbata/wiestii</i>	Gramineae	1	Slender oat (Fig. 3) [VII] *
<i>Bellevia</i> sp.	Liliaceae	2	Roman squill [VII]
cf. <i>Brachypodium distachyon</i>	Gramineae	2	Purple false-brome [X]
cf. <i>Bromus</i>	Gramineae	1	Brome cf. [IX-X]
<i>Carthamus</i> sp.	Compositae	1	Safflower [IX-X] *
<i>Carthamus tenuis</i>	Compositae	1	Slender safflower [IX-X] *
<i>Chenopodium murale</i>	Chenopodiaceae	19	Nettle-leaved goosefoot [VII, IX-X]
<i>Cicer pinnatifidum</i>	Papilionaceae	1	Judean chickpea [IX-X] *
cf. <i>Cynodon dactylon</i>	Gramineae	1	Bermuda grass cf. [X]
cf. <i>Cyperus</i>	Cyperaceae	2	Nut-grass cf. [VIII] *
<i>Echium angustifolium/judaicum</i>	Boraginaceae	1	Hispid/judean viper's bugloss [IX-X]
cf. <i>Euphorbia aleppica</i>	Euphorbiaceae	1	Pine spurge cf. [VII] *
<i>Galium</i> sect. <i>Kolgyda</i>	Rubiaceae	6	Bedstraw [VII, VIII, IX-X, X]
<i>Hordeum spontaneum</i>	Gramineae	2	Wild barley [IX-X] *
<i>Hordeum spontaneum/bulbosum</i>	Gramineae	1	Wild/bulbous barley [VII]
<i>Hymenocarpus circinnatus</i>	Papilionaceae	1	Disk trefoil [VII]
<i>Lathyrus hierosolymitanus</i>	Papilionaceae	1	Jerusalem vetchling (Fig. 4) [VII]
<i>Lathyrus inconspicuus</i>	Papilionaceae	1	Small-flowered vetchling [IX-X]
<i>Lathyrus</i> sect. <i>Cicerula</i>	Papilionaceae	16	Vetchling [VII]
cf. <i>Lathyrus</i> sect. <i>Cicerula</i>	Papilionaceae	56	Vetchling cf. [VII, VIII, IX-X, X]
<i>Lens</i> sp.	Papilionaceae	247	Lentil [VII, VIII, IX, X]
<i>Malva</i> sp.	Malvaceae	1	Mallow [IX-X] *
<i>Mercurialis annua</i>	Euphorbiaceae	43	Annual mercury [VII, VIII, IX-X, X]
<i>Onosma gigantea</i>	Boraginaceae	1	Giant golden-drop [X]
<i>Onosma orientalis</i>	Boraginaceae	5	Syrian golden-drop [VII, IX-X]
<i>Pistacia atlantica</i> (nutlet fragments)	Anacardiaceae	503	Atlantic pistachio (Fig. 5) [VII, VIII, IX-X, X] *
<i>Pisum fulvum/Vicia palaestina</i>	Papilionaceae	2	Yellow wild pea/Palestine vetch [VII]
<i>Pisum fulvum/Vicia narbonensis/peregrina</i>	Papilionaceae	1	Yellow wild pea/purple broad-bean/rambling vetch [IX-X]
<i>Quercus</i> sp. (shell fragments)	Fagaceae	43	Oak [VII, VIII, IX-X, X] *
<i>Raphanus raphanistrum</i>	Cruciferae	1	Wild radish [VII] *
cf. <i>Raphanus raphanistrum</i>	Cruciferae	1	Wild radish cf. [VII] *
<i>Scorpiurus muricatus</i>	Papilionaceae	1	Two-flowered caterpillar (prickly scorpiontail) [VII]
cf. <i>Scorpiurus muricatus</i>	Papilionaceae	1	Two-flowered caterpillar cf. (prickly scorpiontail) [VII]
cf. <i>Silene aegyptiaca</i>	Caryophyllaceae	1	Egyptian campion cf. [VIII]
<i>Trifolium</i> sp.	Papilionaceae	1	Clover (trefoil) [VII]
<i>Vicia cuspidata/lathyroides</i>	Papilionaceae	8	Spring vetch [VII, VIII, IX-X, X]
<i>Vicia ervilia</i>	Papilionaceae	8	Bitter vetch (Fig. 6) [VII, IX-X, X] *
<i>Vicia laxiflora/tetrasperma</i>	Papilionaceae	1	Slender/smooth tare [IX-X]
<i>Vicia lutea/sativa/sericocarpa</i>	Papilionaceae	1	Yellow/common (true) vetch [VII]
cf. <i>Vicia narbonensis</i>	Papilionaceae	1	Purple broad-bean cf. [VII]
<i>Vicia palaestina</i>	Papilionaceae	1	Palestine vetch [IX-X]
<i>Vicia palaestina/sativa</i>	Papilionaceae	1	Palestine/common (true) vetch [IX-X]
<i>Vicia palaestina/villosa</i>	Papilionaceae	1	Palestine/winter (hairy) vetch [VII]
<i>Vicia peregrina</i>	Papilionaceae	1	Rambling vetch [VIII]
<i>Vicia pubescens</i>	Papilionaceae	2	Vetch [VIII]
<i>Vitis vinifera</i> ssp. <i>sylvestris</i>	Vitaceae	1	Wild grape-vine [IX-X] *
Large-seed legumes	Papilionaceae	712	[VII, VIII, IX, IX-X, X]
Medium-seed legumes	Papilionaceae	1369	[VII, VIII, IX, IX-X, X]
Small-seed legumes	Papilionaceae	877	[VII, VIII, IX, IX-X, X]
Unidentified		249	All units
Total		4205	



Kebara-Höhle

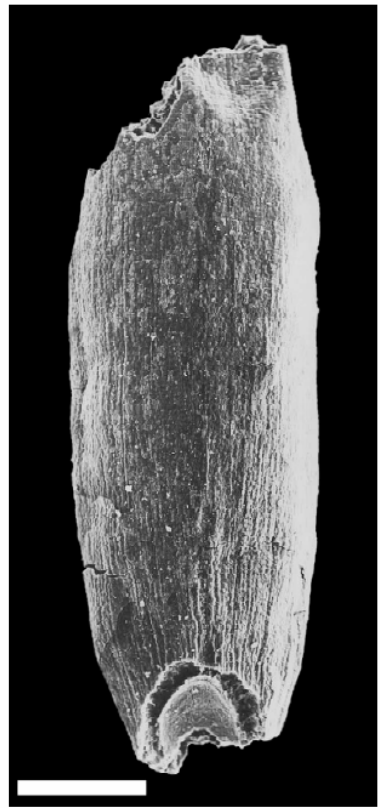


Fig. 3. Slender oat (*Avena barbata/wiestii*). Grain, dorsal view  $\times 50$  (bar = 500  $\mu\text{m}$ ).

Wilder Hafer

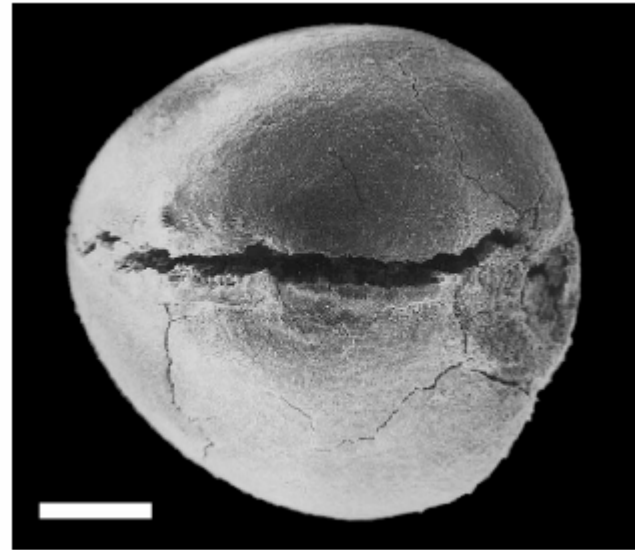


Fig. 6. Bitter vetch (*Vicia ervilia*), seed  $\times 30$  (bar = 500  $\mu\text{m}$ ).

Linsenwicke

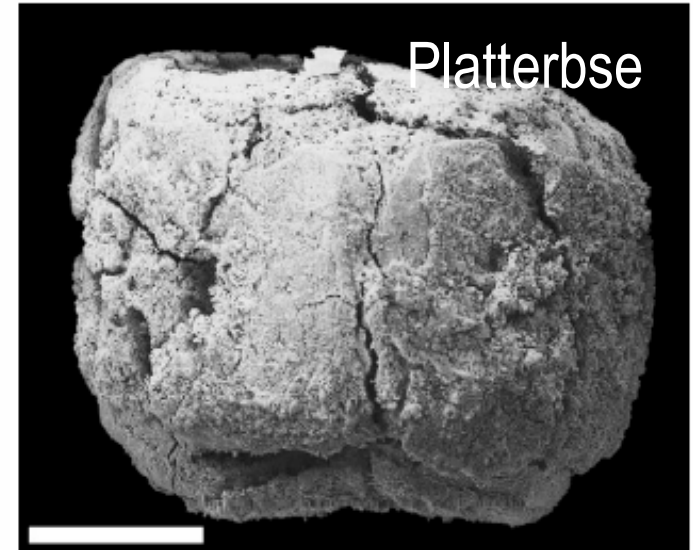


Fig. 4. Jerusalem vetchling (*Lathyrus hierosolymitanus*), seed  $\times 20$  (bar = 1 mm).

Pistazie

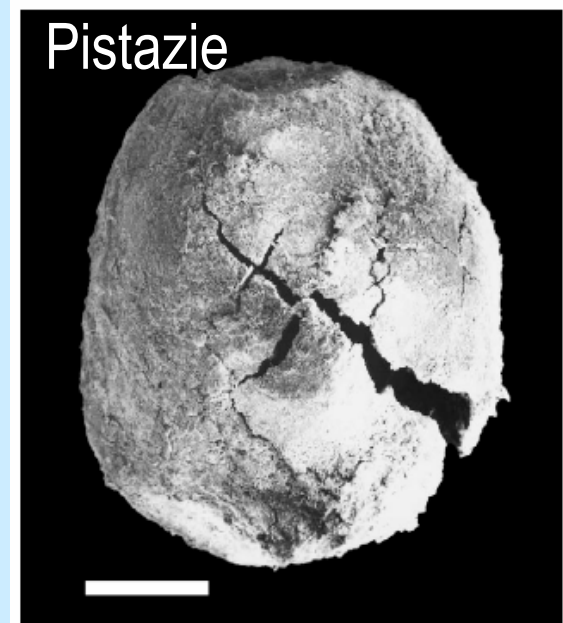


Fig. 5. Atlantic pistachio (*Pistacia atlantica*), nutlet  $\times 20$  (bar = 1 mm).

Einige Beispiele verkohlter Samen/Früchte

Kebara-Höhle

# In welcher Jahreszeit hielten sich die Menschen in der Höhle auf?

Table 3  
Potential seasonal distribution of plants found in Kebara Cave

Plant	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Atlantic pistachio					*	***	***	***				
Wild cereals		*	***	***	*							
Wild vine					***	***	***					
Legumes	***	***	***	***								
Oak acorns							***	***	***	*	*	*
Safflower			***	***	***							
Wild radish and mallow	**	*						*	***	***	***	***

\*\*\*Major availability; \*minor availability [30].

V.a.: Frühling- Frühsommer

Herbst

Längere Aufenthaltsdauer???

Jagd: Winter – frühes Frühjahr



# Fazit Kebara Höhle

- Hinweise auf eine Nutzung sehr verschiedener Ressourcen durch die Neanderthaler im Mittelpaläolithikum! (“**broad spectrum foraging**”)
- Pflanzennahrung spielte eine wichtige Rolle
- Nahrung muss gekocht worden sein

## Weiteres Bsp. aus dem Mittelpaläolithikum

### **The Exploitation of Plant Resources by Neanderthals in Amud Cave (Israel): The Evidence from Phytolith Studies**

Marco Madella\*<sup>1</sup> and Martin K. Jones<sup>2</sup>

*McDonald Institute for Archaeological Research, Downing Street, Cambridge CB1 2ER, U.K.*

*Journal of Archaeological Science* (2002) **29**, 703–719

The depositional environments of Amud Cave indicate that phytolith assemblages retrieved from the cave's sediments are an integral part of the Middle Palaeolithic sequence. As such, they provide direct evidence for plant use. The Amud Neanderthals emphasized both wood and grass exploitation. Ligneous parts of trees and shrubs were used mainly for fuel. Herbaceous plants were used for bedding, possibly fuel, and for food. There is clear and repetitive evidence for the exploitation of mature grass panicles, inferred to have been collected for their seeds. These findings suggest that, as with the pattern recently discerned for faunal resources, a broad spectrum of plants has been exploited from *at least* the end of the Middle Palaeolithic. Phytolith analysis now provides a tool for testing models explaining subsistence and mobility patterns during the Levantine Middle Palaeolithic and for better understanding the role of vegetal resources in shaping these patterns.

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# JUNGPALÄOLITHIKUM

Nach ca. 40'000 / 35'000 Jahren vor heute

# Jungpaläolithikum: Bsp. 1

Epipalaeolithic (19,000 BP) cereal and fruit diet at Ohalo II,  
Sea of Galilee, Israel

M.E. Kislev<sup>a</sup>, D. Nadel<sup>b</sup> and I. Carmi<sup>c</sup>

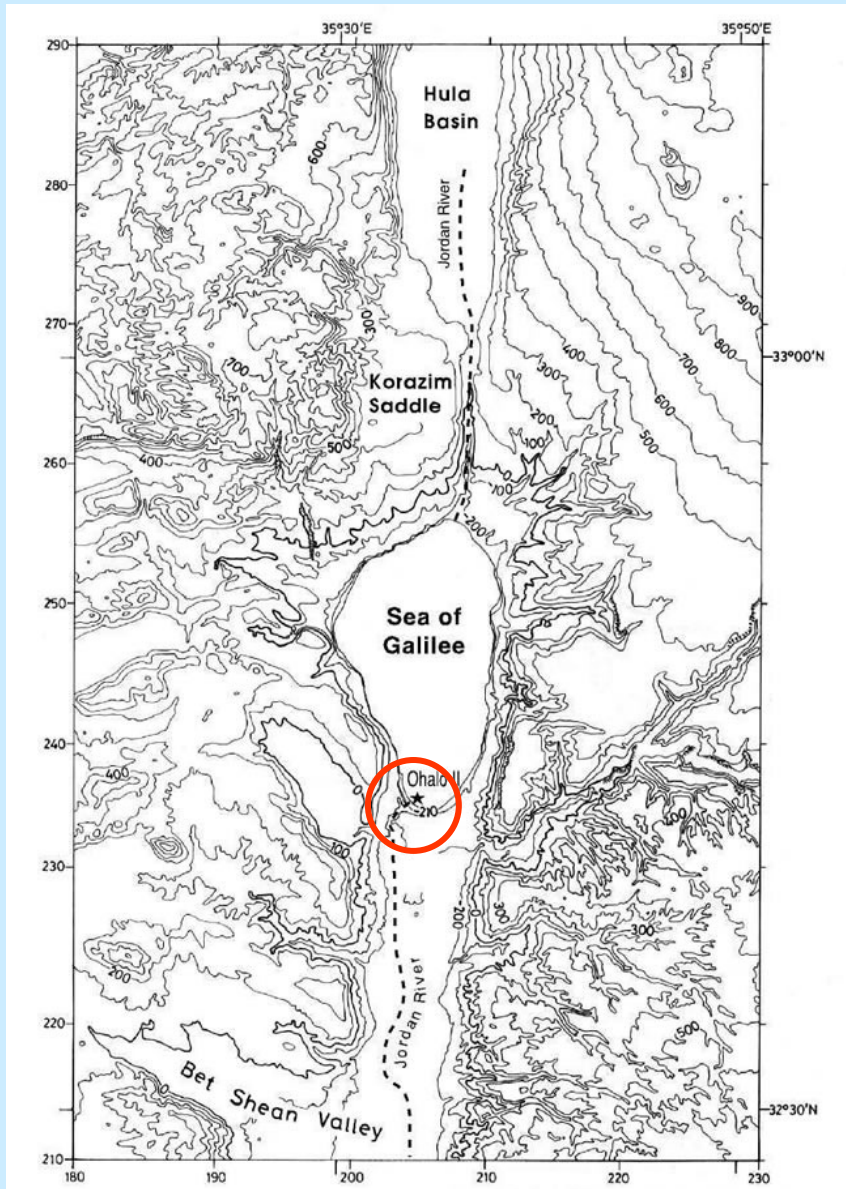
*Review of Palaeobotany and Palynology*, 73 (1992): 161–166  
Elsevier Science Publishers B.V., Amsterdam

<sup>14</sup>C-dates of charred wood from Ohalo II

Location	Age (BP)	Sample
Square AB87	15,550 ± 130	RT-1246
Square AB87	18,760 ± 180	RT-1359
Square B85b	19,000 ± 190	RT-1251
Square B85c	19,800 ± 360	RT-1248
Square B88d	19,700 ± 200	RT-1342
Square B89b	18,900 ± 400	RT-1252
Square C85c	18,600 ± 220	RT-1358



# Lage von Ohalo II



Ohalo II at the beginning of the 1989 season, looking southeast.





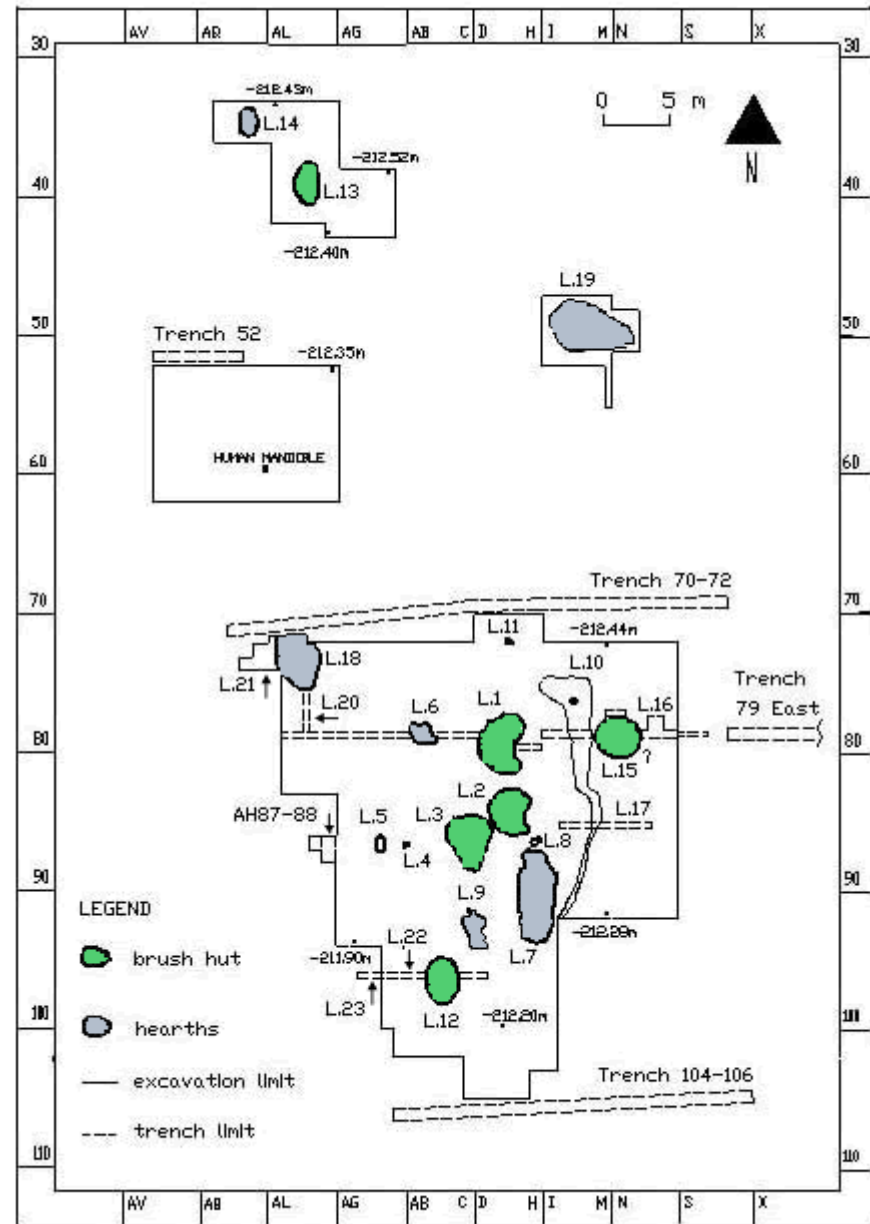
Rettunggrabung, Israel Antiquities Authority



Hut 1 during the Ohalo II 1991 season, looking west



Reconstructed hut, according to the Ohalo II finds.



Ohalo II 2001, plan of main area of excavations





## Schlammstation im See

Bis 1992 0,92 m<sup>3</sup> Sediment  
geschlämmt (2mm-Sieb),  
zusätzliche 17 l aus einer  
Herdstelle in einer "Hütte" bis  
0,5mm geschlämmt

## Archäobotanik: Methoden



A millimetric twisted cord from Ohalo II.



# Archäobotanik: Ergebnisse

## Charred edible plant remains from Ohalo II

Plant name	Plant organ	Quantity <sup>1</sup>	
		a	b
Grasses with edible grains			
<i>Aegilops geniculata</i> peregrina	grain	110	12
<i>Avena barbata</i> Pott ex Link	grain		4
<i>Avena sterilis</i> L.	grain	8	
<i>Bromus</i> sp.	grain	1	4
<i>Catabrosa aquatica</i> (L.) Beauvois	grain	1	65
<i>Hordeum bulbosum</i> L.	grain	10	12
<i>Hordeum glaucum</i> Steudel	grain	6	20
<i>Hordeum spontaneum</i> C. Koch	grain	588	41
<i>Hordeum spontaneum</i>	rachis node		30
<i>Triticum dicoccoides</i> (Koernicke) Aaronsohn	grain	20	1
<i>Triticum dicoccoides</i>	spikelet base	1	8
Unidentified grasses	grain	15	91

## Edible wild fruits

<i>Amygdalus</i> sp.	nutshell fragment	2	
<i>Crataegus</i> sp.	stone	12	
<i>Nitraria schoberi</i> L.	stone	153	12
<i>Olea europaea</i> L.	stone fragment	1	
<i>Pistacia atlantica</i> Desfontaines	nutshell fragment	1	1
cf. <i>Pyrus syriaca</i> Boissier	seed	1	
<i>Quercus</i> sp.	nut fragment	14	29
<i>Vitis vinifera</i> L.	pip	2	
<i>Ziziphus spina-christi</i> (L.) Desfontaines	stone fragment	2	

## Other edible wild plants

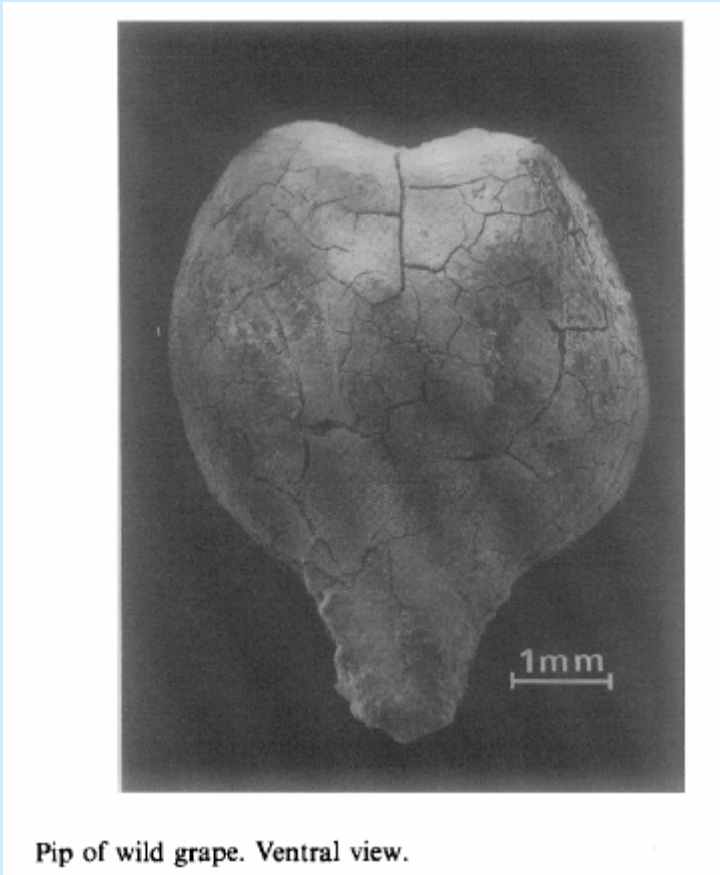
<i>Atriplex</i> sect. <i>Rosea</i>	fruit		1
Chenopodiaceae	embryo	1	2
<i>Erodium</i> sp.	seed		1
<i>Lens</i> sp.	seed	1	
<i>Malva</i> sp.	seed		7
<i>Scirpus littoralis</i> Schrader	nutlet		3
<i>Suaeda</i> sp.	seed		211
Viciae	seed	1	
Other wild plants			
<i>Arundo/Phragmites</i>	culm fragment	1	
<i>Chara</i> spp.	nucule		806
<i>Galium</i> sect. <i>Kolgyda</i>	fruit	2	3
<i>Hippocrepis</i> sp.	seed		1
<i>Potamogeton</i> sp.	fruitlet		11
<i>Potamogeton pectinatus</i> L.	fruitlet	28	16
<i>Styrax officinalis</i> L.	stone fragment		2
Umbelliferae	fruit		1
Unidentified	fruit/seed	34	54

<sup>1</sup>plant organs retrieved by: a = 2 mm- and b = 0.5 mm-mesh.

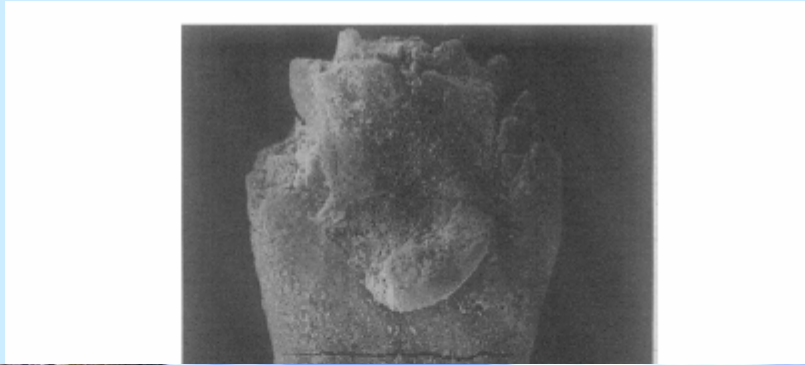
Nur verkohlte Reste, diese aber gut erhalten

Viel Wildgerste!

# Kern einer wilden Weintraube



# Wild-Gerste: Spindelglied



# Ohalo II: Saison???

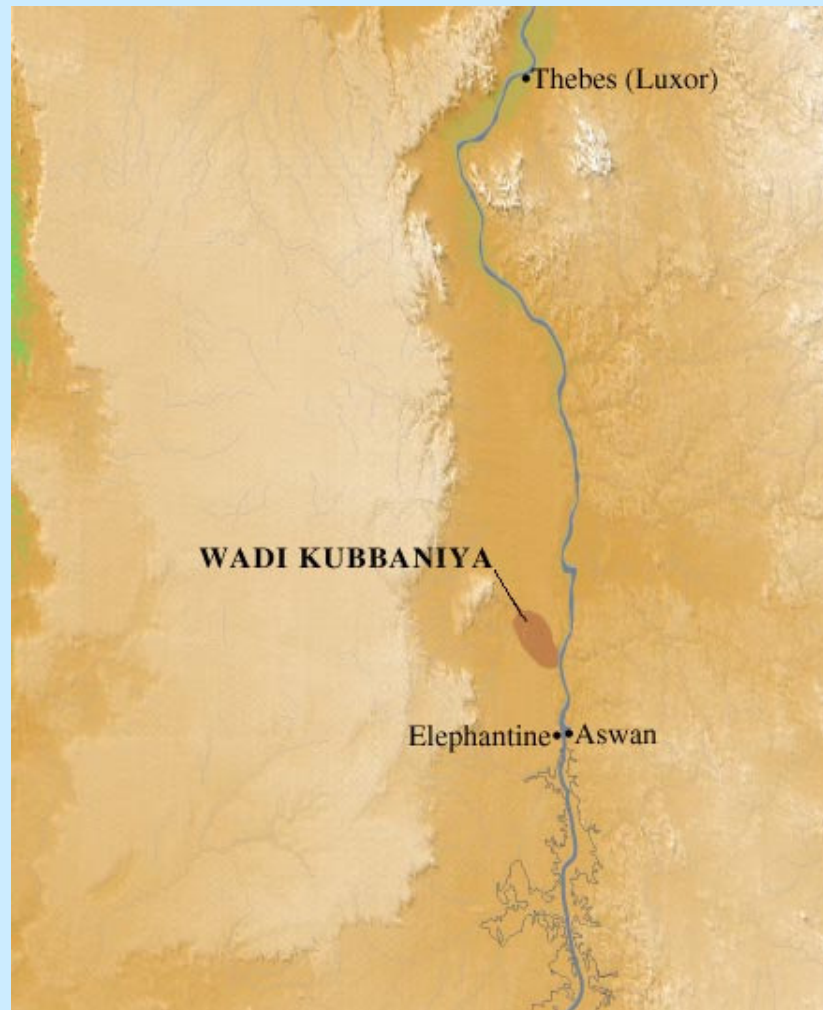
Ripening seasons of some of the edible plants listed in Table 1

Plants	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Edible grasses												
<i>Aegilops</i> spp.				+	+							
<i>Avena sterilis</i>				+	+							
<i>Hordeum spontaneum</i>				+	+							
<i>Triticum dicoccoides</i>				+	+							
Wild fruits												
<i>Amygdalus</i>								+	+			
<i>Crataegus</i>									+		+	
<i>Olea europaea</i>										+		
<i>Pistacia atlantica</i>								+	+			
<i>Quercus</i>										+		
<i>Vitis vinifera</i>										+		
<i>Ziziphus spina-christi</i>				+				+	+		+	

Gräser: Frühling-Frühsummer

Baumfrüchte: Herbst

# Jungpaläolithikum: Wadi Kubbaniya, Oberägypten (ca. 17'000-15'000 BC)





## Wüste.....



View looking southeast toward the mouth of the Wadi.



View looking south. Workers at the Late Paleolithic site E-81-5, ca. 15,000 B.C.

# Archäobotanik

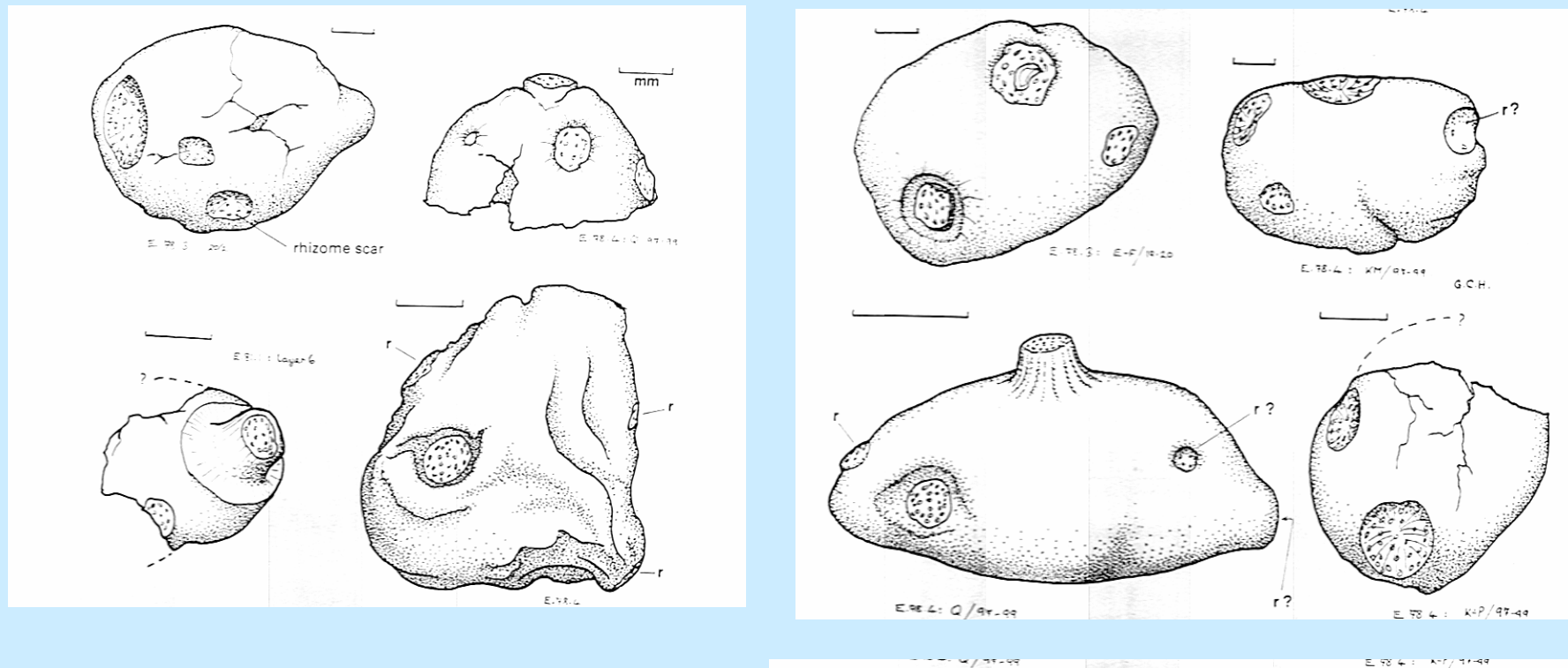
- Da verk. Pflanzenreste sehr fragil, sobald in Kontakt mit Wasser, Material trocken gesiebt
- Mehrere hundert m<sup>3</sup> Sediment
- Reichlich verkohlte Pflanzenreste
- Rezente Verunreinigungen (durch AMS-Daterungen entdeckt)!!

# Ergebnisse der archäobotanischen Untersuchung (1)

Site code	E-81-6	E-78-3	E-81-1	E-78-4
Layers sampled	(all one layer)	(layers 18-24)	(layers 1-8)	(layers a-h)
Radiocarbon dates from <i>Cyperus</i> and <i>Scirpus</i> tubers (yrs bp)	ca. 19000	18000-17600	18000-17200	17800-17300
Total numbers of units (layers and squares) sampled for plant remains	6 units	27 units	10 units	78 units
Average volume dry-sieved for plant remains from each unit	2.2 m <sup>3</sup>	5.1 m <sup>3</sup>	7.5 m <sup>3</sup>	1.9 m <sup>3</sup>
Total volume dry-sieved for plant remains at each site	13 m <sup>3</sup>	137 m <sup>3</sup>	75 m <sup>3</sup>	130 m <sup>3</sup>
	(+100 m <sup>3</sup> of levels 1-16 which were unproductive)			
<b>I. CHARRED REMAINS OF VEGETATIVE TISSUES AND ORGANS</b>				
<i>Cyperus rotundus</i> (wild nut-grass) { whole tubers	—	4 (7)	3 (8)	12 (14)
{ tuber fragments	—	28 (43)*	10 (73)*	24 (31)*
either <i>C. rotundus</i> or <i>Scirpus marit.</i> , tuber fragments	—	3 (6)*	3 (5)*	3 (4)*
<i>Scirpus maritimus/tuberosus</i> type { whole tubers	—	—	1 (4 cm <sup>3</sup> )	—
{ tuber fragments	—	1 (1)?	—	—
Pteridophyte (fern), dictyostelous rhizome fragments	—	—	1 (2 cm <sup>3</sup> )	—
indeterminate parenchyma fragments {	—	—	1 [5 mm <sup>3</sup> ]	—
	—	—	2 [8 mm <sup>3</sup> ]	—
	—	2 [3 mm <sup>3</sup> ]	—	—
	—	1 [5 mm <sup>3</sup> ]	—	1 [3 mm <sup>3</sup> ]
	—	—	—	1 [6 mm <sup>3</sup> ]
indeterminate monocot. stem fragment (in coprolites)	—	—	2 [ . . . ]	—
indeterminate monocot. leaf fragments (in coprolites)	—	—	2 [ . . . ]	—

Sehr häufig: unterirdische Pflanzenteile!!!!

# Verkohlte Reste von Rhizomen von *Cyperus rotundus*



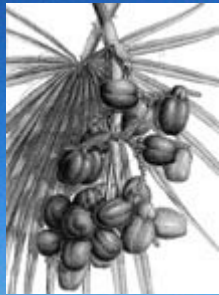
**Figure 13.1** Charred remains of stem tubers of the wild nut-grass (*Cyperus rotundus*) – a type of sedge – from sites E-78-3, E-78-4, and E-81-1. This type of wild tuber was probably a major source of carbohydrate at Wadi Kubaniya, and its remains abound on all three of these sites, although absent from site E-81-6. The tubers drawn here are unusually intact but are smaller than the apparent original size of the majority which survived in fragmented form. (Drawing: G. Hillman; from Hillman *et al.* in press.)



# Cyperus rotundus: modern



# Ergebnisse der archäobotanischen Untersuchung (2)



strongly curved embryo (3 mm  $\phi$ )  
*Liliaceae* type 'b', seed (ovoid > 3 mm  $\phi$ , embryo  $\pm$  straight)  
 cf. *Umbelliferae* type (aniseed family), kernel of mericarp

indeterminate seed/fruit { type 'a'  
 type 'b'  
 type 'c'  
 type 'd'  
 type 'e'  
 indeterminate fruit-skin fragment (*Capparis* type)

### III. CHARRED REMAINS OF COPROLITES

The different types of coprolite of human origin are tabulated in detail in Hillman *et al.* (in press), and are here amalgamated in three broad categories:

xxx = abundant; xx = occasional; x = rare.

cf. human faeces of extremely fine texture (from infants?)  
 cf. human faeces of slightly coarser texture (from children?)  
 cf. avian faecal segments, resembling those of the *Anserinae* and *Anatinae* (water-fowl)

—	1 [4 mm <sup>3</sup> ]	—	3 [8 mm <sup>3</sup> ]
—	—	1 (4+)	—
—	—	in coprolite	—
—	—	1 (3+)	—
—	—	1 (12+)	—
—	—	—	1 (1)
—	1? (1?)	1 (1)	—
—	1? (1?)	—	—
—	2 (2)	—	—
—	—	—	—
—	1 (1)	—	—
—	1 (1)	—	—
—	—	1 (1)	—
—	1 (1)	—	—
—	—	1 (1)	—
—	1 (1)	—	—
—	1 (1)	—	—

Div. Verkohlte Samen/Früchte, z.T. im Inneren von Koprolithen!

—	xx	xx	xxx
—	x	xxx	x
xxx	xxx	xxx	xxx

# Weitere Ergebnisse

- Sehr viele **Fischknochen** (v.a. Wels; >100'000): kommt zum Laichen bei Einsetzen des Hochwassers: ca. Anfangs Juli in dieses Gebiet!)
- **Wasservögel!** (Enten, Gänse) (im Winter anwesend)
- **Muscheln** (Unio = Teichmuschel): reichlich
- Auch div. Andere Kleintiere
- Wenig grössere Säugetiere



# Saisons

Wels: Juli; Wasservögel: Winter

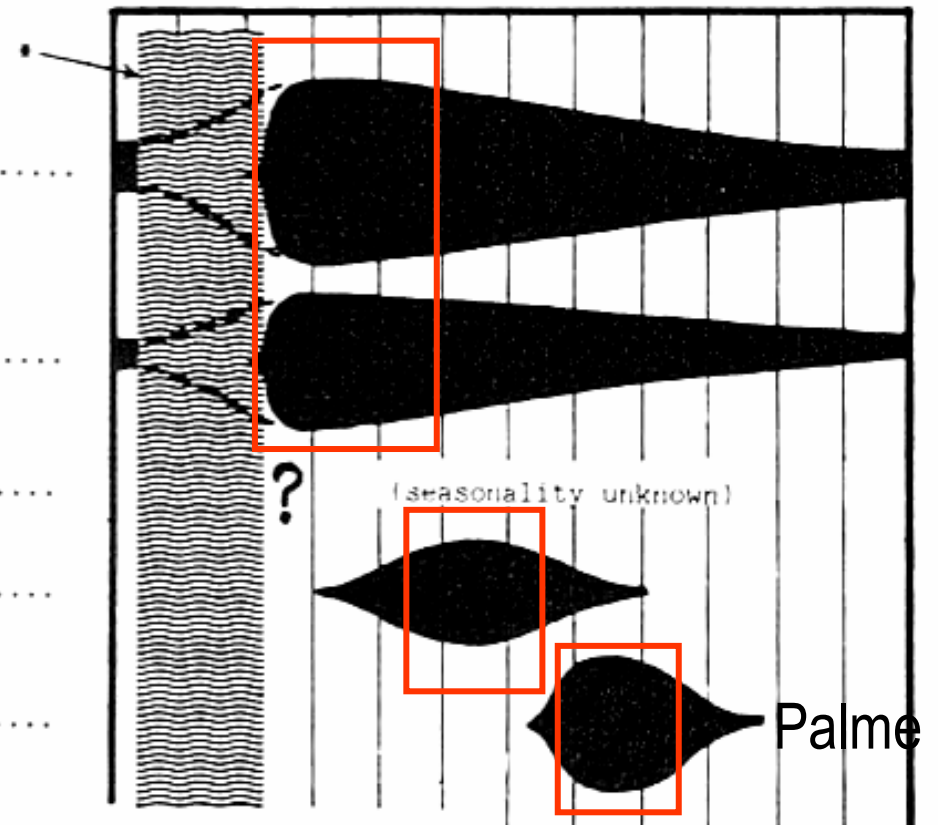
## 1. PLANT FOODS IDENTIFIED IN THE REMAINS

- 'Root' foods
- Wild Nut-grass tubers (*Cyperus rotundus*).....
  - Club-rush tubers (*Scirpus tuberosus*) .....
  - Fern rhizome (indeterminate) .....
- seeds & fruits
- Club-rush nutlets (*Scirpus tuberosus*) .....
  - Döm Palm fruits (*Hyphaene thebica*) .....

Unterirdische Pfl. Teile

Samen/Früchte

August - - - - Months of the year - - - - - July  
A S O N D J F M A M J J



Palme

Spätherbst – Winter - Frühling



# Jung-/Epipaläolithikum

Danièle Martinoli · Stefanie Jacomet

**Identifying endocarp remains and exploring their use  
at Epipalaeolithic Öküzini in southwest Anatolia, Turkey**

Veget Hist Archaeobot (2004) 13:45–54

Nach etwa 15'000 BC deutlich mehr (...) Fundplätze und mehr Pflanzenreste: erste Anzeichen von Sesshaftigkeit! Bsp. Aus dem Nahen Osten bekannte und archäobotanisch untersuchte Fundstellen sind: Tell Abu Hureyra, Tell Mureybet, Hallan Cemi, Nahal oren, Hayonim, Wadi Jilat 6 .....

# Lage, Stratigraphie, Datierung: Höhle Öküzini

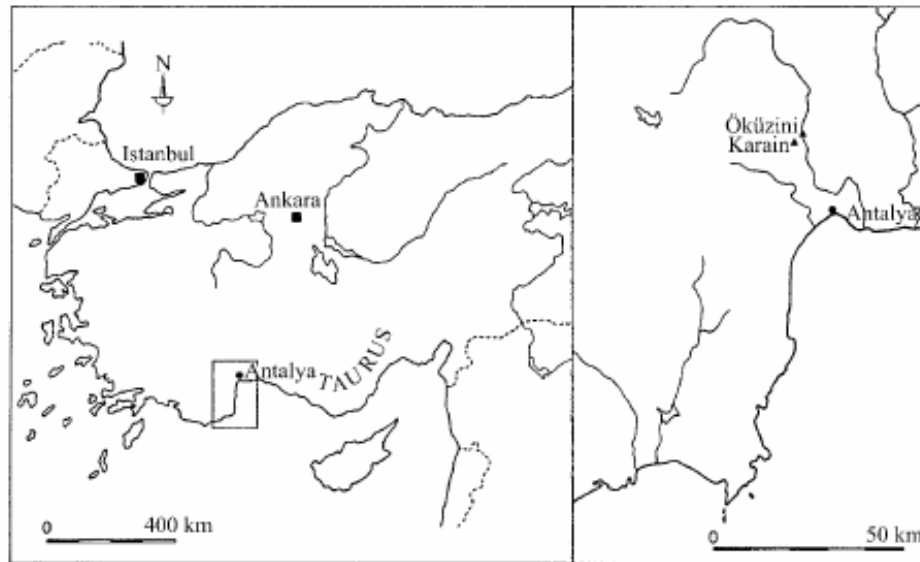


Fig. 1 Location map of Öküzini Cave



Straten I-IV: 18'200 –  
11'800 cal. BC, 3,5 m  
mächtige Schichtenfolge

Im Küstengebirge, bei  
Antalya

Besonders auffällig: viele Reste von Steinkernen Wilder **Mandeln** (Amygdalus; 1280 Stück)!

modern

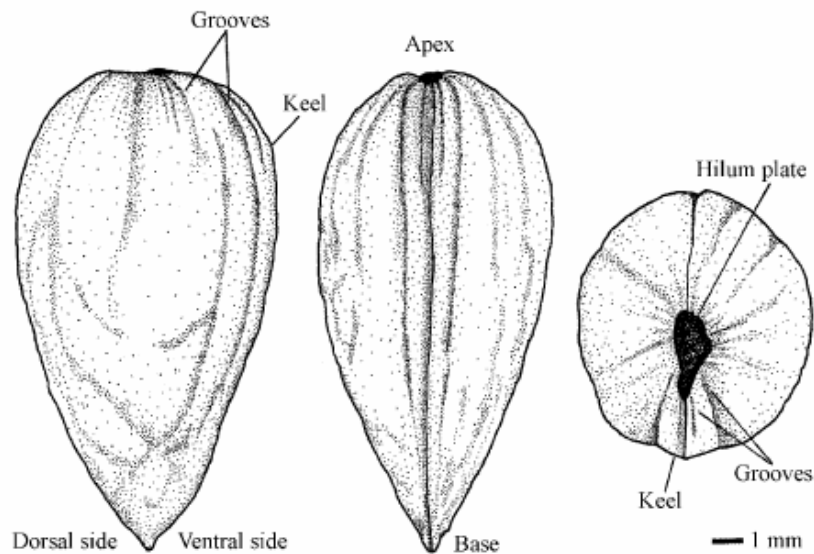
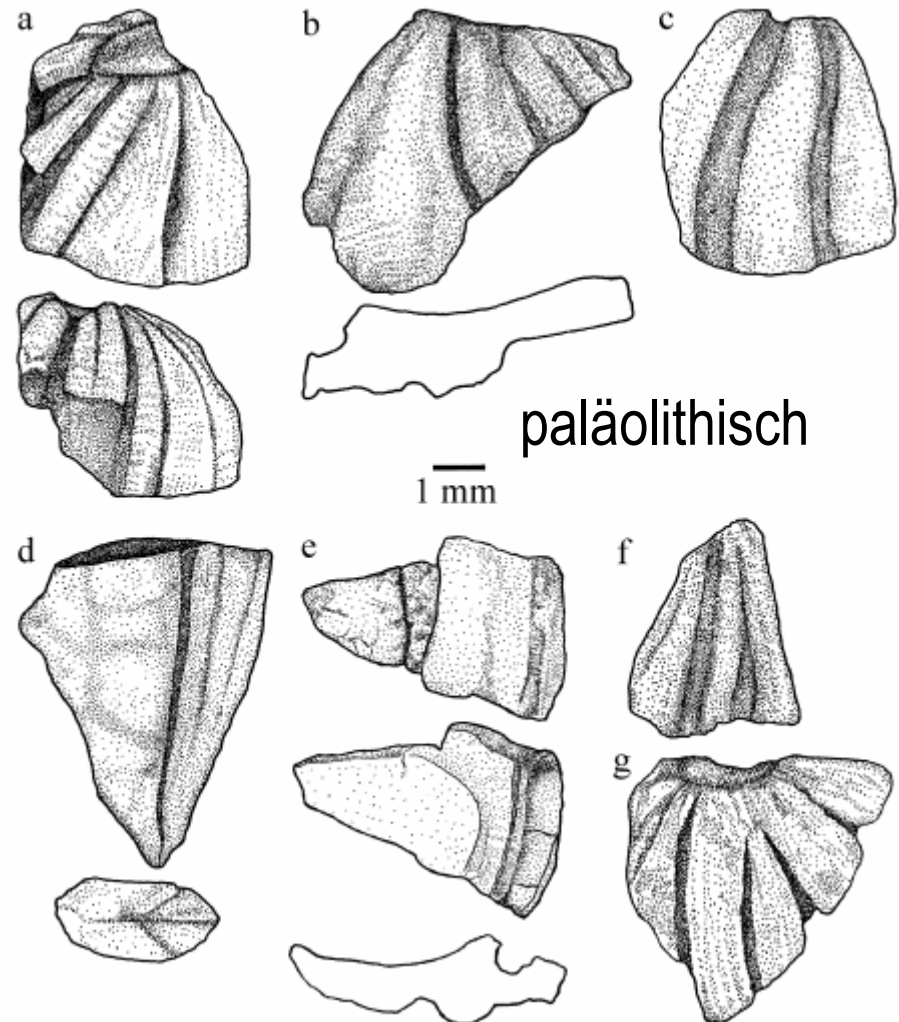


Fig. 2 Modern *Amygdalus graeca* Lindley (Hacettepe University Herbarium AAD 3970) with the essential features of *Amygdalus* and *Prunus* endocarps



➔ *A. orientalis* oder *A. graeca*

Fig. 4a-g Fossil endocarp fragments uncovered from Öküzini. a fragment with hilum plate and keel; b fragment from the apex with keel, grooves and main vascular bundle cavity; c fragment with grooves; d pointed base fragment with keel; e fragment from the middle of the endocarp, with keel and main vascular bundle cavity; f fragment with grooves; g fragment with hilum plate and grooves

# Wilde Mandeln....

- Wichtige Nahrungsressource im ausgehenden Paläolithikum des Nahen Ostens
- In div. Fundstellen nachgewiesen
- “**high energy food**” (fettreich)
- Systematisches Einsammeln im **Spätsommer**



# Jungpaläolithikum / Frühmesolithikum Europa

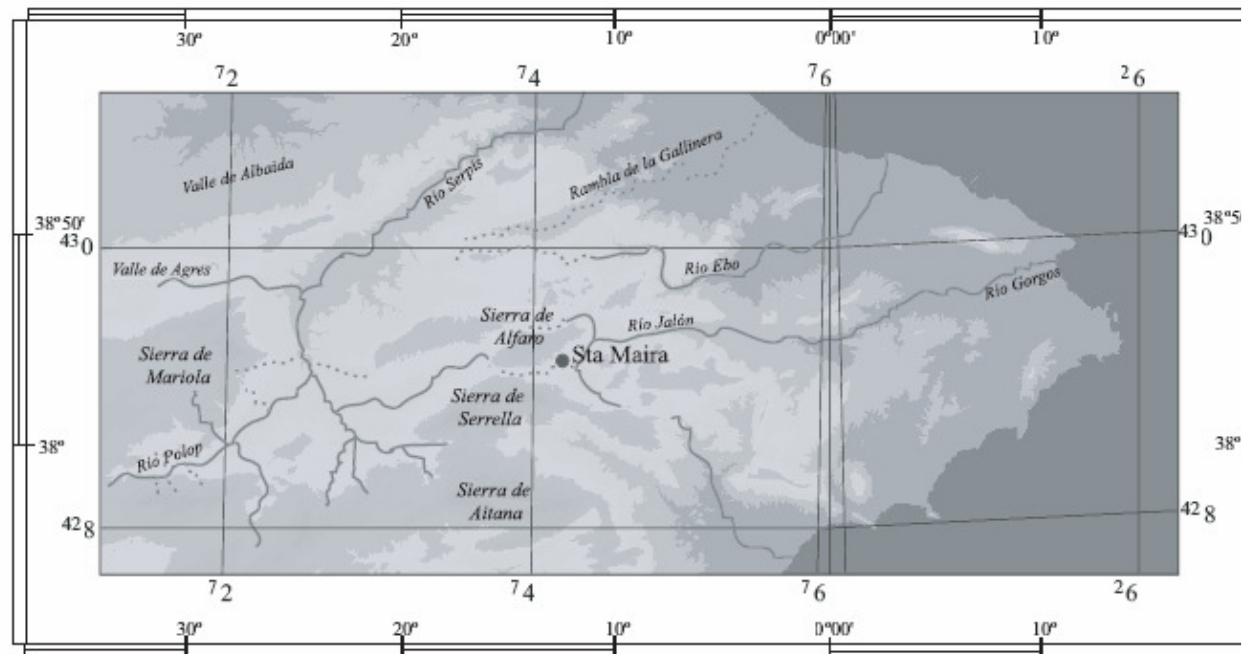
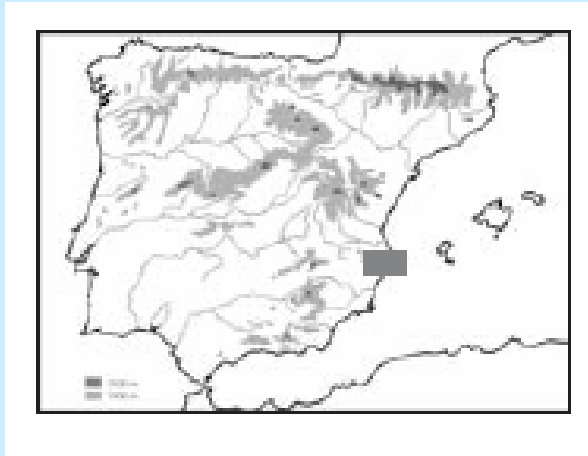
Josep Emili Aura · Yolanda Carrión · Elena Estrelles ·  
Guillem Pérez Jordà

**Plant economy of hunter-gatherer groups at the end of the last  
Ice Age: plant macroremains from the cave of Santa Maira  
(Alacant, Spain) ca. 12000–9000 B.P.**

Veget Hist Archaeobot (2005) 14: 542–550  
DOI 10.1007/s00334-005-0002-1

Weitere Bsp.: Franchiti-Höhle (Griechenland), Grotta dell'Uzzo (Sizilien), div.  
Höhlen in Spanien und Südfrankreich

# Lage: Santa Maira Höhle



Aura et al 2005, VHA 14,  
542-550

Liegt in der Nähe von Alicante, bei  
Castell de Castells

Tab. 1 Dating and description of the samples

LEVEL	REF.	DATE $\pm$ 1 SD	PERIOD	METHOD
<b>Boca oeste</b>				
3-1	Beta-149947	80 $\pm$ 40	Mesolithic	AMS (bone)
4A-4	Beta-131578	9760 $\pm$ 40	Epipaleolithic	C14 (Charcoal)
4A-5	Beta-156022	9220 $\pm$ 40	Epipaleolithic	AMS (bone)
4A-5	Beta-156021	9370 $\pm$ 40	Epipaleolithic	AMS ( <i>Vicia / Lathyrus</i> ) (Seed)
4A-12	Beta-158013	420 $\pm$ 40	Epipaleolithic	AMS ( <i>Olea</i> sp) (Charcoal)
4A-12	Beta-158014	9820 $\pm$ 40	Epipaleolithic	AMS ( <i>Quercus</i> sp) (Charcoal)
4B-14	Beta-156023	11920 $\pm$ 40	Upper Magdalenian	AMS (bone)
4B- 15	Beta-131579	11620 $\pm$ 150	Upper Magdalenian	C14 (Charcoal)
4B/5	Beta-149948	11590 $\pm$ 70	Upper Magdalenian	AMS (bone)

# Archäobotanik: Methoden

- Gesamtes Sediment während der Grabung geschlämmt, 5mm Siebmaschenweite
- Weitere Bodenproben im Labor bis **0,5 mm** Maschenweite geschlämmt
- Total **145 Proben**
- Gesamtvolumen des geschlämmten Erdmaterials: **4500 l**



# Ergebnisse: Verkohlte Samen und Früchte

Funddichte: 0,05 Stk/l

**Table 2** Carbonized fruits and seeds: left column = frequency (number of samples in which a species was present), right column = number of remains recovered

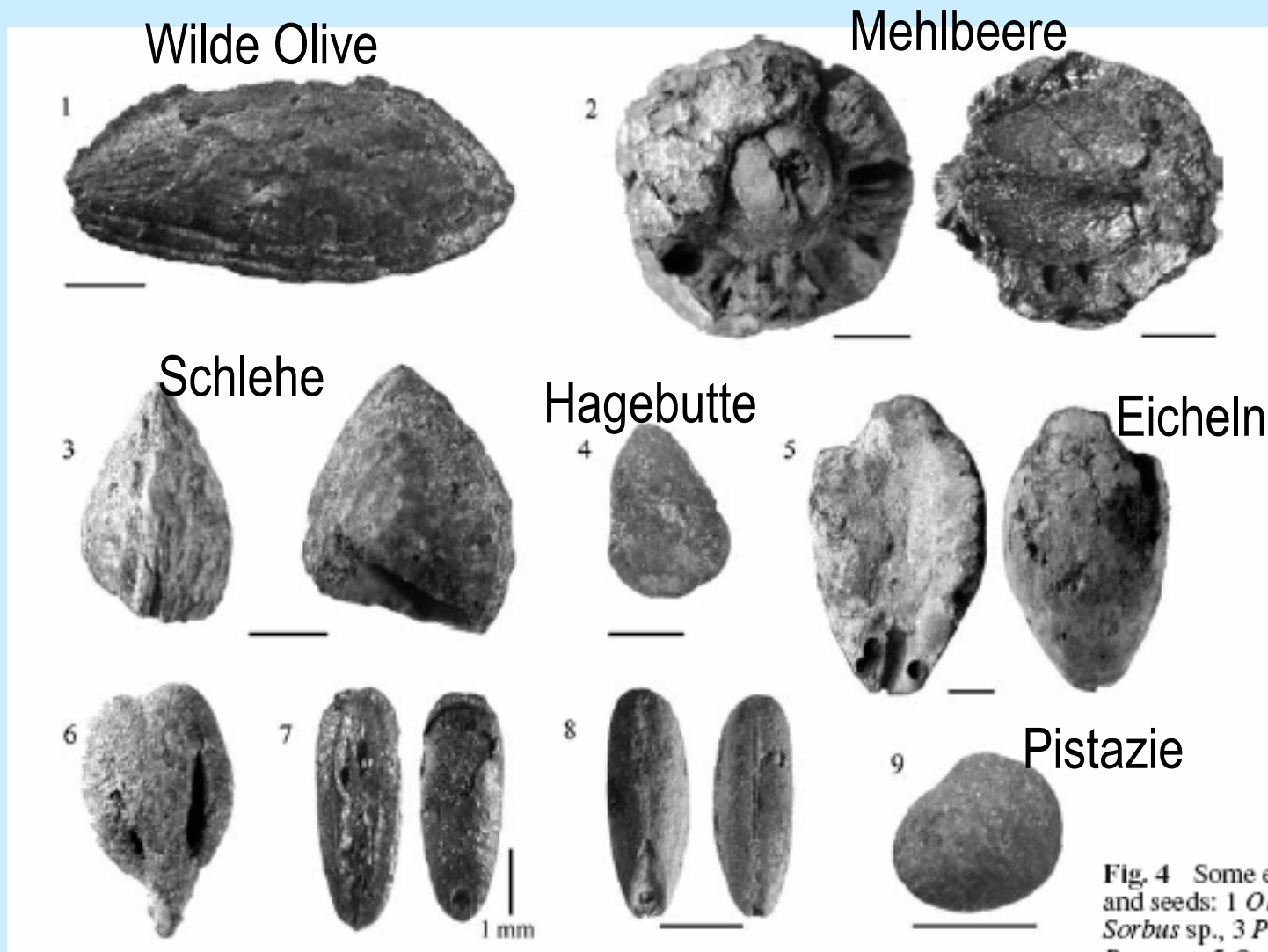
	Magdalenian		Epipalaeolithic		Mesolithic	
	N samples (a)	N seeds/fruits	N samples (a)	N seeds/fruits	N samples (a)	N seeds/fruits
N samples	48		73		24	
Vol. litres	975		1919		1323	
Avena sp.	2	2			1	1
Lolium cf. temulentum	1	1				
Gramineae (wild)	1	1	4	5	1	1
Triticum aestivum/durum				1		
Grasses total		4		6		2
Leguminosae	13	12	13	26	2	2
Medicago/Melilotus			2	2		
Vicia/Lathyrus	5	6	7	7	2	2
Vicia/Lens			3	3	1	1
Legumes total		18		38		5
cf. Cotoneaster	1	1				
Olea europaea					3	3
Pistacia sp.	2	2	3	3		1
Prunus spinosa	1	1	1	1		
Quercus sp.	24	18	35	25	19	10
Rosa sp.	3	3	7	7	1	1
Sorbus sp.	3	3	2	2	1	2
Pomoideae fruits	14	14	10	10		
Rapistrum type					1	1
Juniperus cf. oxycedrus	1	1	2	2		
Vitis vinifera var. sylvestris			4	4		
Galium sp.	2	2				
Indet	6	6	9	15	1	1
Total (n)		73		113		26

Hülsenfrüchte

Div. "Baumfrüchte"

212

# Beispiele der verkohlten Früchte



Wilde Olive

Mehlbeere

Schlehe

Hagebutte

Eicheln

Pistazie

Weinrebe

Gräser

Fig. 4 Some examples of fruits and seeds: 1 *Olea europaea*, 2 *Sorbus* sp., 3 *Prunus spinosa*, 4 *Rosa* sp., 5 *Quercus* sp., 6 *Vitis vinifera* ssp. *sylvestris*?, 7 *Lolium* cf. *temulentum*, 8 *Avena* sp., 9 *Pistacia* sp.; scale bars = 2 mm unless otherwise noted

## Genutzte Hülsenfrüchte

2 und 3: Wicken oder Platterbse oder Linse



Fig. 5 Some examples of legume seeds: 1 *Medicago/Melilotus*, 2 *Vicia/Lens*, 3 *Vicia/Lathyrus*; scale bars = 1 mm unless otherwise noted

# Jungpaläolithikum – Frühmesolithikum CH

## Feuerstelle von Monruz



Vue aérienne du littoral après la construction de l'autoroute, montrant l'emplacement des gisements de Monruz et Champréveyres (été 2000).



Les foyers C48 et C49 avec, au premier plan, une omoplate de cheval et un bois de renne ; au second plan, plusieurs vertèbres de cheval en connexion anatomique.

Fundstellen Monruz und Champréveyres am Lac de Neuchâtel



# Stratigraphie, Datierung

Magdalénien: am Ende der ätesten Dryas-Zeit, um 13'000 BP uncal. = ca. 15'000 BP cal.

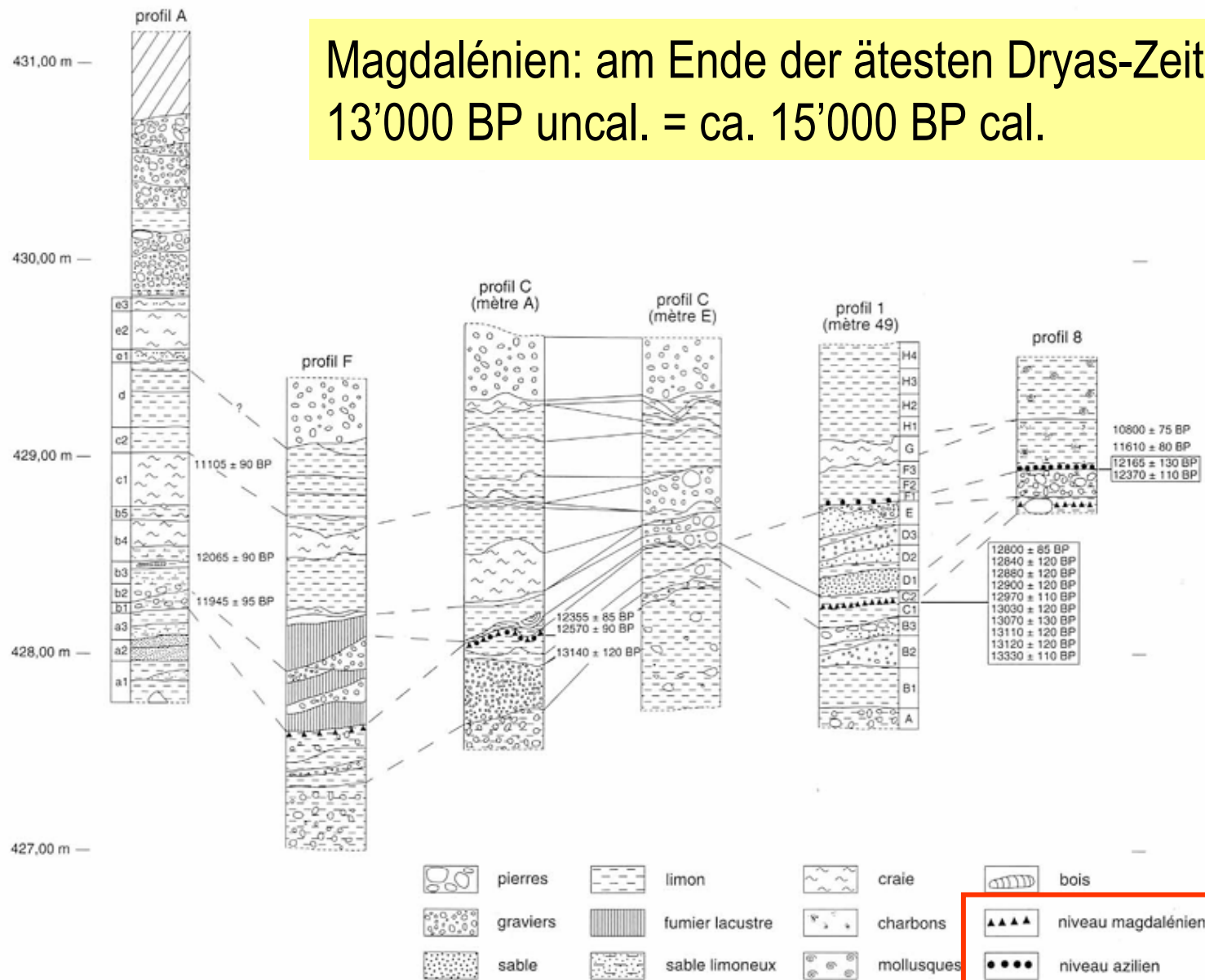


Fig. 28. Corrélation des profils étudiés.

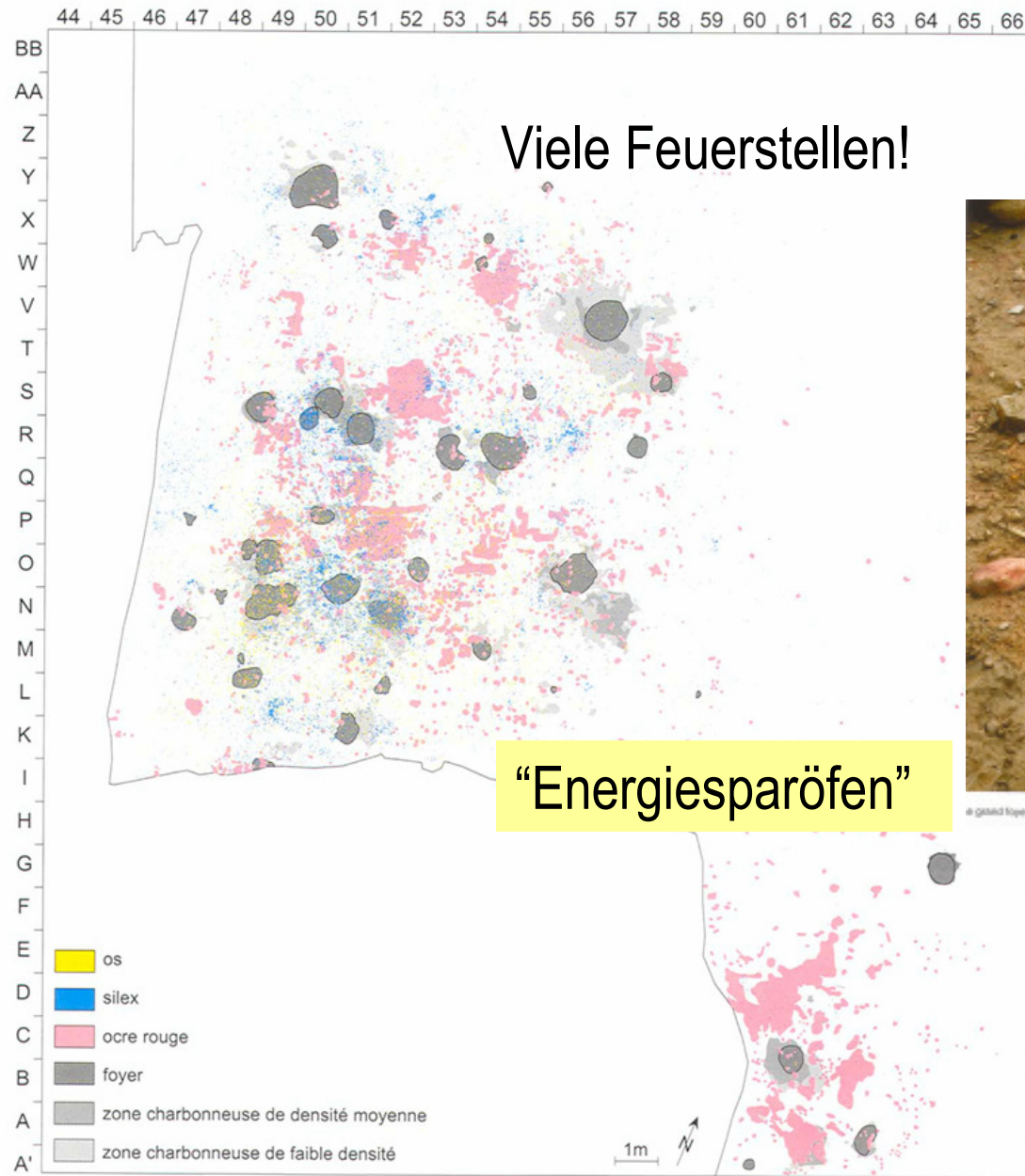
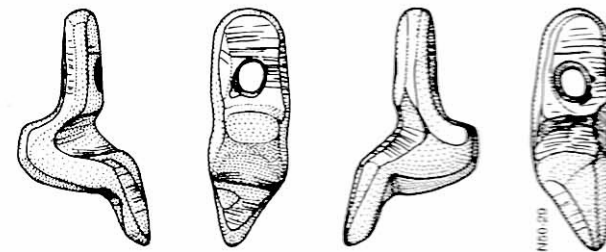


Fig. 35. Plan de répartition des vestiges (sans les pierres).

## Der Magdalénien-Siedlungshorizont



## Frauenfigürchen aus Gagat



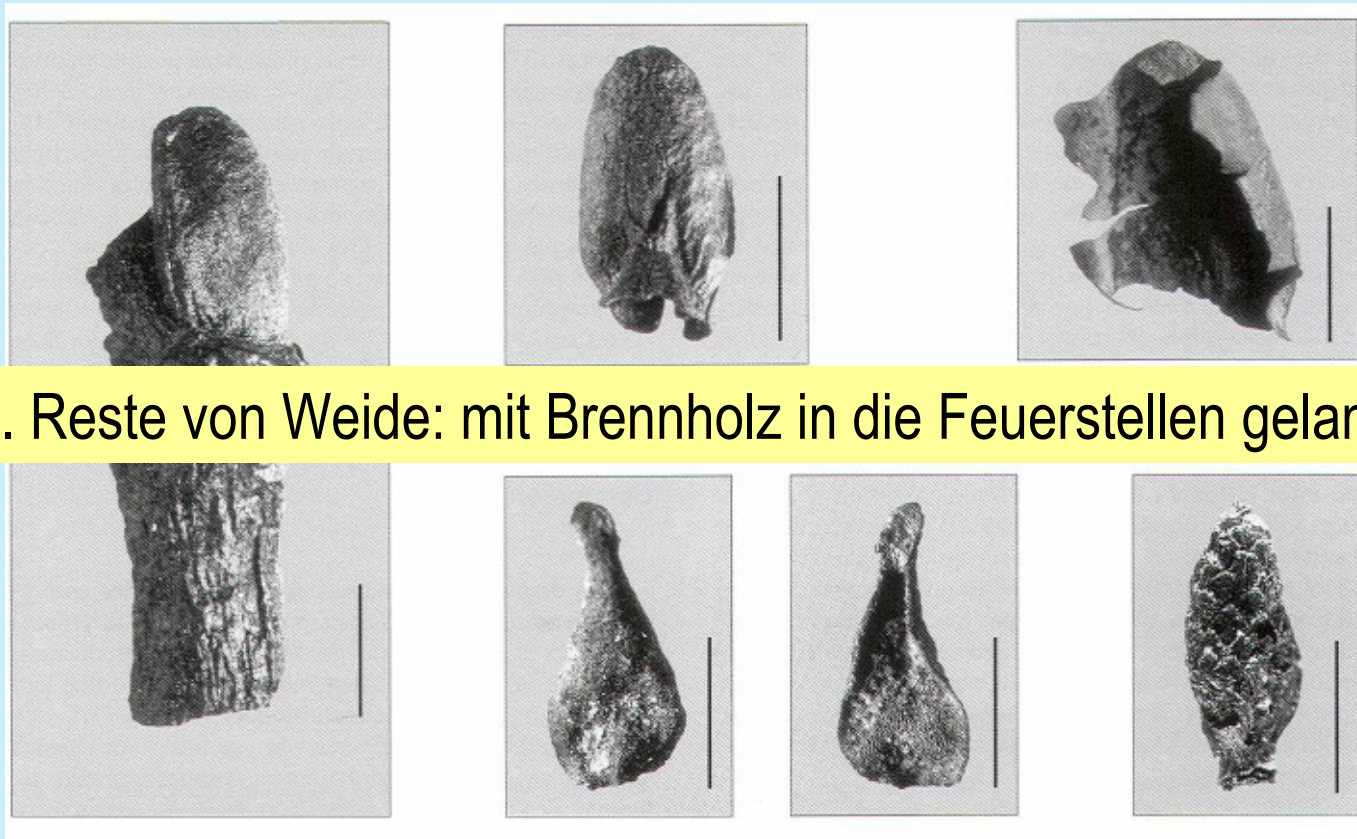
# Ergebnisse Archäobotanik 1: **Holzkohle**

Sehr viel Holzkohle (1725 St. bestimmt):

99% Zwergweide, 1% Zwergbirke



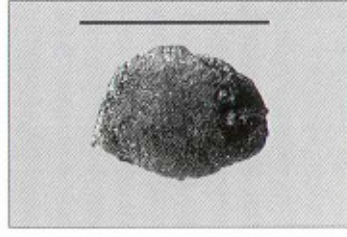
# Ergebnisse Archäobotanik 2: Samen/Früchte



Div. Reste von Weide: mit Brennholz in die Feuerstellen gelangt

Fig. 99. Macrorestes végétaux carbonisés recueillis dans les foyers de Monruz: 1, *Salix* sp., brindille avec bourgeon; 2, *Salix* sp., bourgeon; 3, *Salix* sp., écaille de bourgeon; 4a, *Salix* sp., demi-ovaire, extérieur; 4b, *Salix* sp., demi-ovaire, intérieur; 5, *Salix* sp., chaton immature; 6, *Silene* sp., graine; 7, *Silene* sp., graine; 8, *Potentilla* sp., akène; 9, *Alchemilla* sp., akène; 10, *Carex* sp., akène trigone; 11, *Poaceae*, caryopse; 12, *Potamogeton* sp., endocarpe; 13, *Allium schoenoprasum*, graine. Longueur du trait: 1 mm.

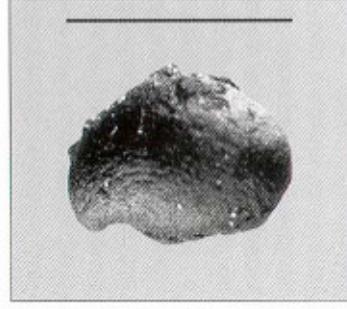




9



13



8



12

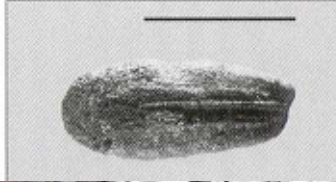
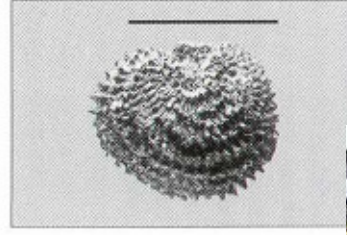


Fig. 99. Macrorestes végétaux carbonisés recueillis dans les foyers de Monruz : 1, *Salix* sp., brindille avec bourgeon ; 2, *Salix* sp., bourgeon ; 3, *Salix* sp., écaille de bourgeon ; 4a, *Salix* sp., demi-ovaire, extérieur ; 4b, *Salix* sp., demi-ovaire, intérieur ; 5, *Salix* sp., chaton immature ; 6, *Silene* sp., graine ; 7, *Silene* sp., graine ; 8, *Potentilla* sp., akène ; 9, *Alchemilla* sp., akène ; 10, *Carex* sp., akène trigone ; 11, *Poaceae*, caryopse ; 12, *Potamogeton* sp., endocarpe ; 13, *Allium schoenoprasum*, graine. Longueur du trait : 1 mm.

# Mesolithikum Europa

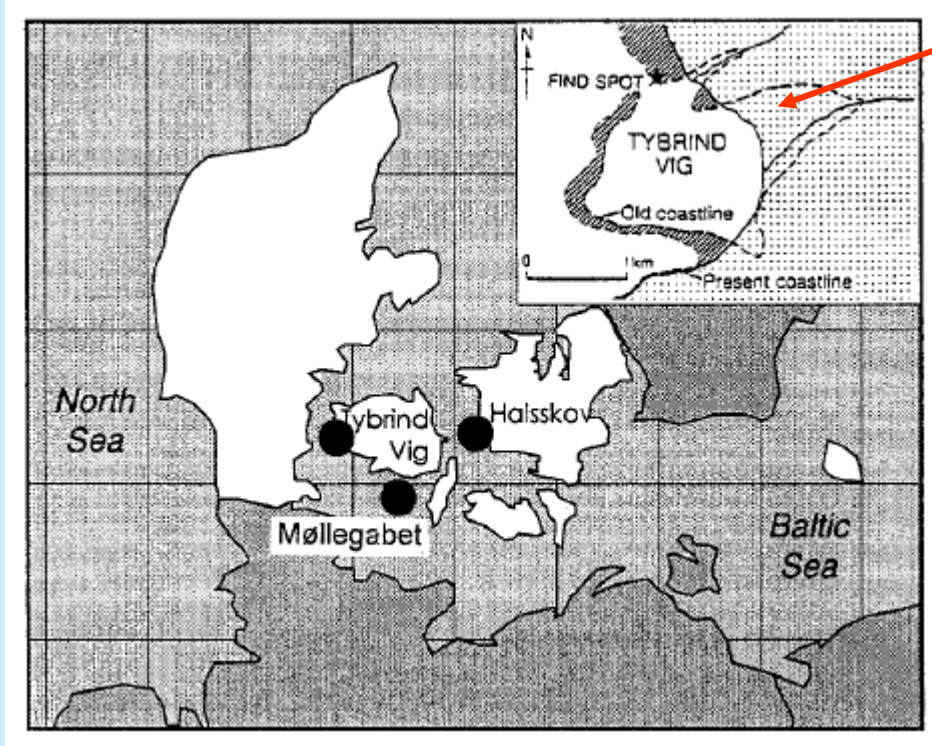
**The plant food component of the diet at the late Mesolithic (Ertebølle) settlement at Tybrind Vig, Denmark**

**Lucyna Kubiak-Martens**

Quaternary Research Institute, Adam Mickiewicz University, Fredry 10, PL-61-701 Poznań, Poland\*

*Veget Hist Archaeobot* (1999) 8:117–127





Lage der Fundstelle

Datierung: 5600-4000 v. Chr.

Lage an der Ostsee-Küste, in einer geschützten Lagune

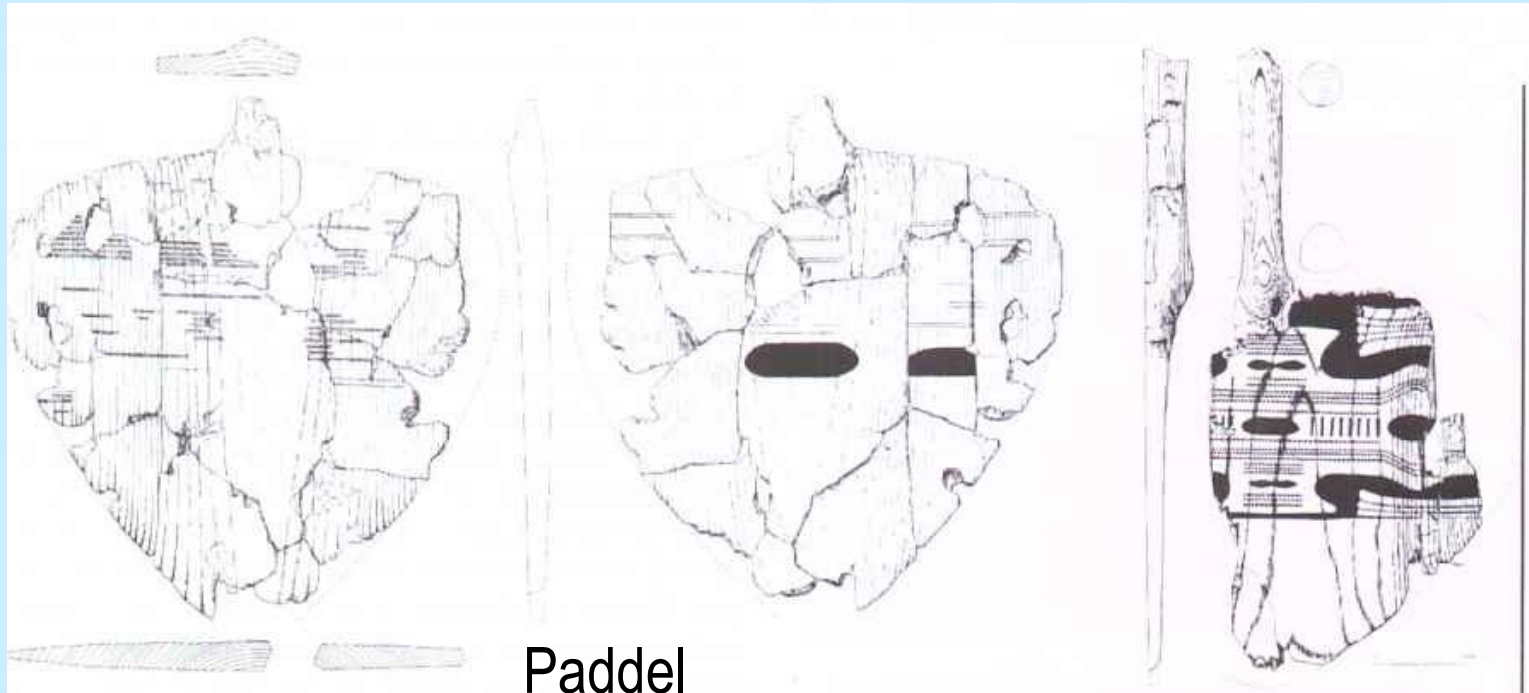
Fig. 1. Map of Denmark showing the location of Tybrind Vig, and other late Mesolithic sites mentioned in the text. Inset map shows Mesolithic and present coastlines, and the position of Tybrind Vig settlement



Feuchtbodenerhaltung

Ausgrabungen 1978-1987, Univ. Aarhus (Unterwassergrabung)

# Fundmaterial



zahlreiche Hinweise auf **Fischereittigkeit** (Fallen, Angelhaken, Einbume, Paddel....)



# Methoden

- 21 Proben aus der 20 cm mächtigen Kulturschicht untersucht
- Alle geschlämmt bis **0,5 mm**
- Eine Anzahl grössere Proben: 7-16 Liter
- Mehrere kleinere (0,8-3 Liter)
- Total **85 Liter**

# Ergebnisse

**Table 1.** Remains of edible plants recovered from the late Mesolithic (Ertebølle) assemblage at Tybrind Vig

Taxon	Kind of remains	Number of specimens in 21 samples
<b>Charred remains</b>		
<i>Corylus avellana</i>	nut-shells	40 fr
<i>Quercus</i> sp	acorn parenchyma.	6 fr
	acorn epidermis	2 fr
<i>Beta vulgaris</i> ssp. <i>maritima</i>	root parenchyma	26 fr
<i>Rumex crispus</i> type	achene	1
<i>Glyceria fluitans</i>	caryopsis	1
<i>Phragmites australis</i>	stem fragments	+++
<b>Waterlogged remains</b>		
<i>Corylus avellana</i>	nut-shells	153 fr
<i>Quercus robur</i>	acorns	15
	acorn epidermis	+++
	cupules	++

## Waterlogged (forts.)

<i>Malus sylvestris</i>	pips	17
<i>Sorbus aucuparia</i>	seeds	3
<i>Crataegus monogyna/ laevigata</i>	fruit-stones	20
<i>Cornus sanguinea</i>	fruit-stones	96
<i>Viburnum opulus</i>	seeds	2
<i>Rubus idaeus</i>	fruit-stones	9
<i>R. caesius</i>	fruit-stones	14
<i>Fragaria vesca</i>	achenes	2
<i>Rosa</i> spp.	seeds	19
<i>Chenopodium album</i>	achenes	47
<i>Atriplex littoralis</i>	achenes	77
<i>Atriplex hastata/patula</i>	achenes	404
<i>Rumex crispus</i> type	achenes	17
<i>Polygonum aviculare</i>	achenes	6
<i>Cakile maritima</i>	capsules	+
<i>Urtica dioica</i>	seeds	3
<i>Scirpus maritimus</i>	achenes	4
<i>Phragmites australis</i>	stem fragments	+++

Frequency scale: + rare, ++ numerous, +++ abundant

Total 46 Taxa

*Beta vulgaris* ssp. *maritima*: Strandrübe (Wilde Form der Zuckerrübe!)



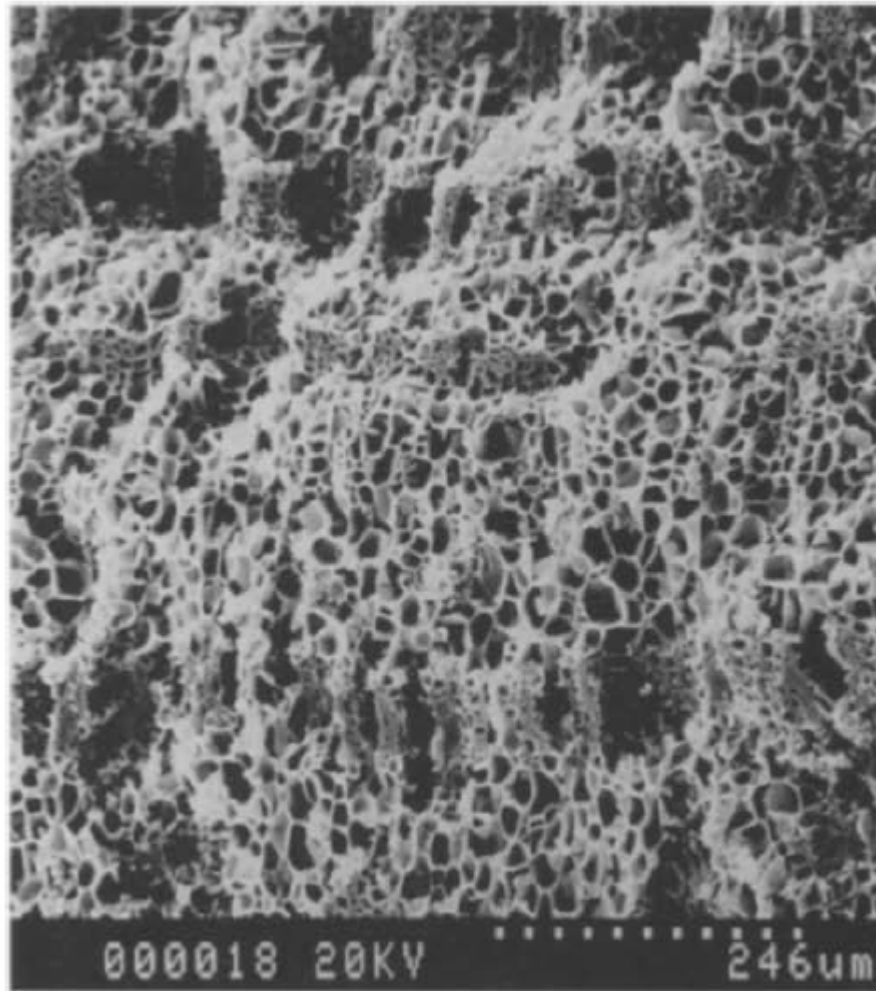




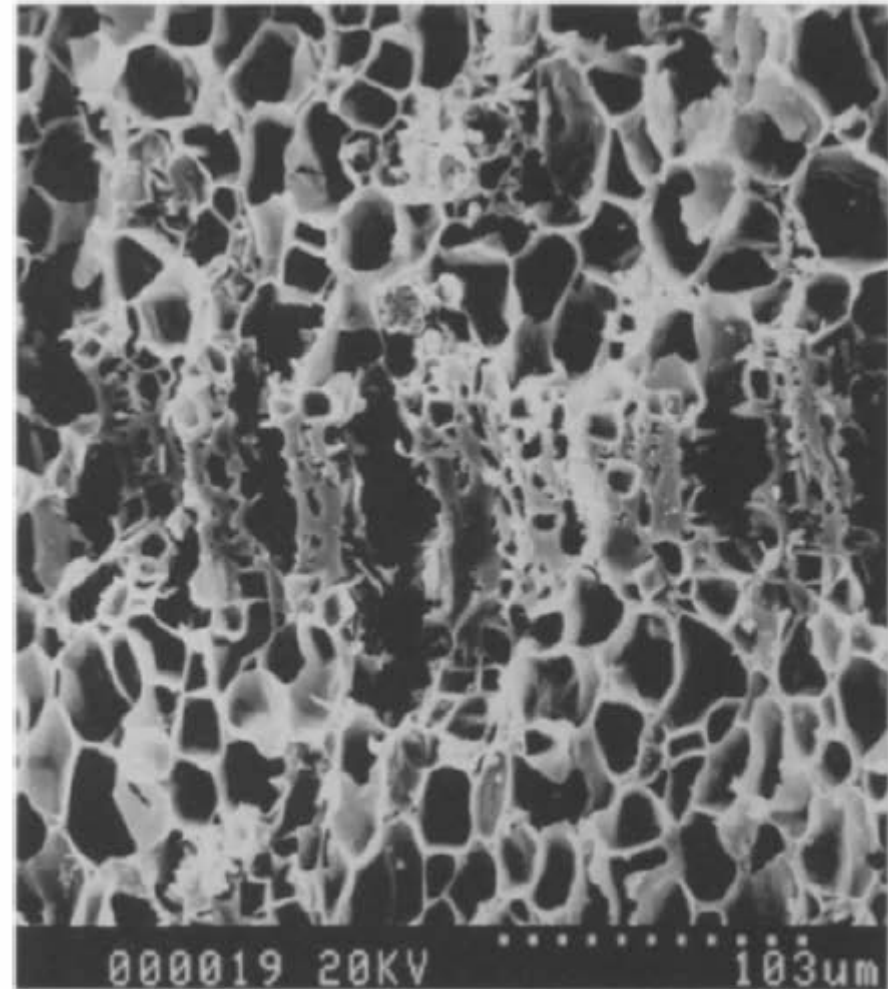
FAM. QUENOPODIÁCEAS  
*Beta maritima* L.



Beta vulgaris ssp. maritima: Parenchym der Wurzel, verkohlt (mesolithisch)



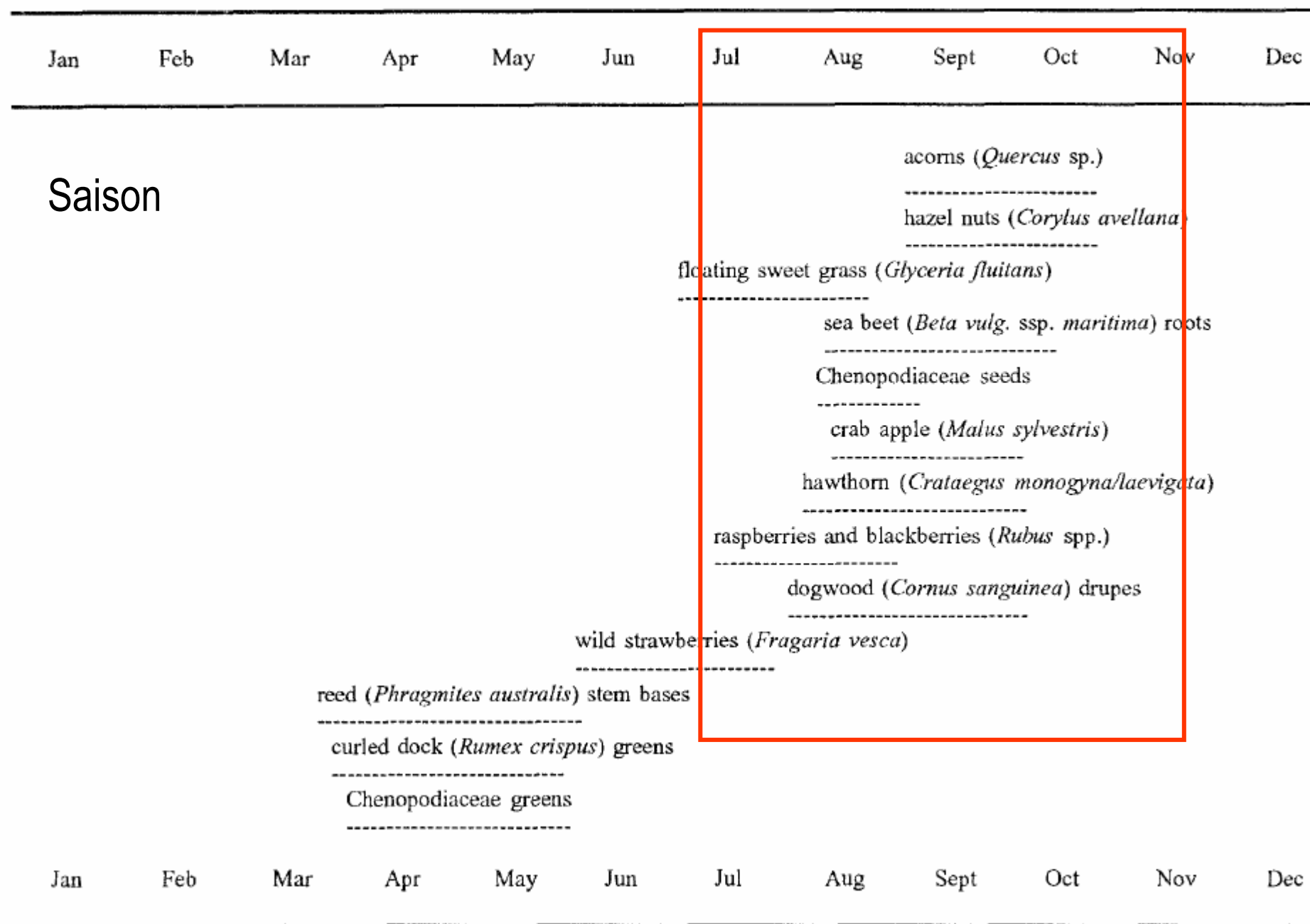
2a



2c

**Fig. 2.** Scanning electron micrographs of charred fragments of parenchymatous tissue, derived from *Beta vulgaris* ssp. *maritima* root. (a,b) Concentric rings of the xylem and broad bands of storage parenchyma between each ring are visible on each specimen; (c) Individual elements of the xylem tissue, and thin walled, rounded parenchyma cells; (d) Vascular tract made up of phloem elements

**Table 2.** Possible seasons of plant food gathering identified in the Tybrind Vig assemblage. The diagram is based on ethnobotanical records of the seasonal cycle patterns of plant gathering among recent hunter-gatherers in North America



# Mesolithikum Mitteleuropa: Pflanzennahrung

- **Unterirdische Pflanzenteile** wurden sehr regelmässig genutzt
- **Früchte** wurden häufig gesammelt (neben der allgegenwärtige Haselnuss noch viele andere!)
- Pflanzennahrung war weit **bedeutender** als früher angenommen!

# Fazit: Pflanzliche Nahrung im Paläolithikum/Mesolithikum

- Pflanzliche Nahrung (generell: Nutzung) war weit **bedeutender**, als noch bis vor kurzem angenommen
- Zu den wichtigen Subsistenztätigkeiten gehörten nicht nur Grosswildjagd und Herstellung von Jagdwaffen, sondern auch **Sammeln von Pflanzen** aber auch von Kleinen Tieren



# Fazit (Forsetzung)

- L. Owen (2005) Distorting the past: Gender and Division of Labour in the European Upper Palaeolithic. Tübingen.
- “... the idea of the weak prehistoric woman tied to the camp by motherhood is a myth. This myth is in direct contradiction to the labour performed by women throughout the world”



Rek. Hebr. Univ. Jerusalem

Owen 2005

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