



NATIONAL GEOGRAPHIC EXPLORER TV 2008
NATIONAL GEOGRAPHIC - NOVA TV 2011

OTZI THE ICEMAN

INSIGHT - SCIENTIFIC AMERICAN –
BRIGHT HORIZONS RHINE CRUISE APRIL 16, 2012

DR. PATRICK HUNT
STANFORD UNIVERSITY

NOVA  NATIONAL
GEOGRAPHIC
Television

ICEMAN MURDER MYSTERY



**Aired OCTOBER 26, 2011
ON PBS**

**PATRICK HUNT IS PART OF A TEAM OF SCHOLARS IN A
NEW FORENSIC INVESTIGATION OF A FAMOUS 5,000-
YEAR-OLD ALPINE ICE MUMMY. THIS NOVA - NATIONAL
GEOGRAPHIC FILM RECONSTRUCTS HIS DEATH AND
REVEALS AN ANCIENT WAY OF LIFE.**



TEN DISCOVERIES THAT REWROTE HISTORY

PATRICK HUNT, Ph.D.
Archeologist,
STANFORD UNIVERSITY





PBS





00:13:16

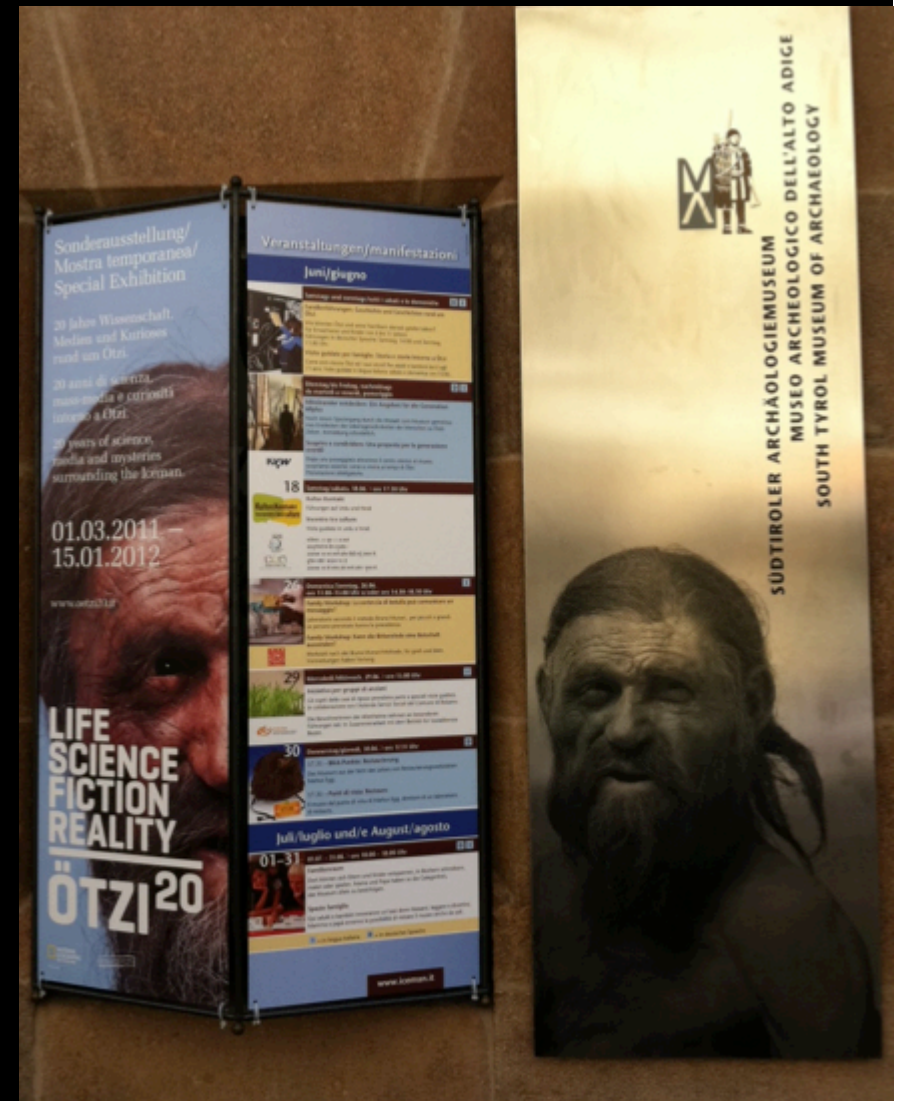
THIRTEEN 



Ötzi the Ice Man 5300 years old *Death of the Ice Man* Nat Geo Explorer TV April 2008



The Alps and Northern Italy in late spring



National Geographic
& NOVA TV 2011



June 2011



June 2011

National Geographic Magazine Image - July 2008

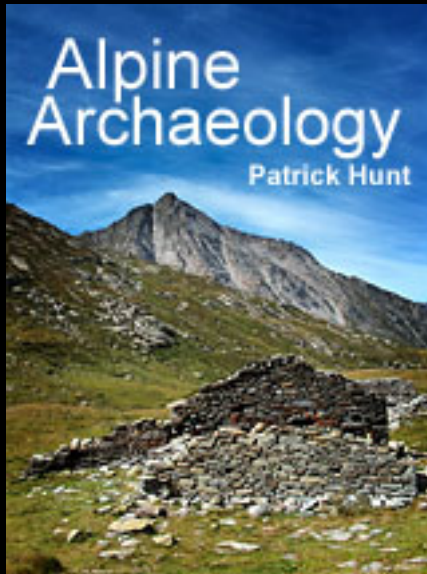




Val Senales Alto Adige



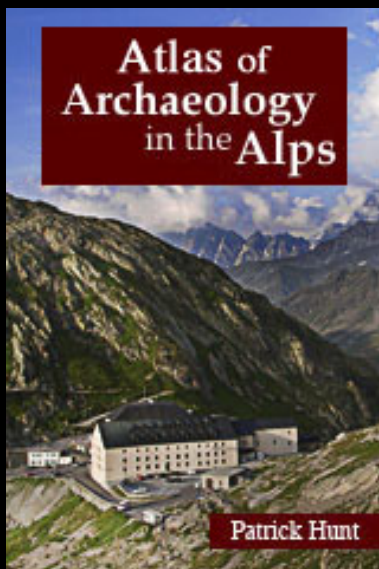
Val Senales Alto Adige



Similaun Pass

Site of
Iceman find

Books citing the 1991
discovery and
subsequent research





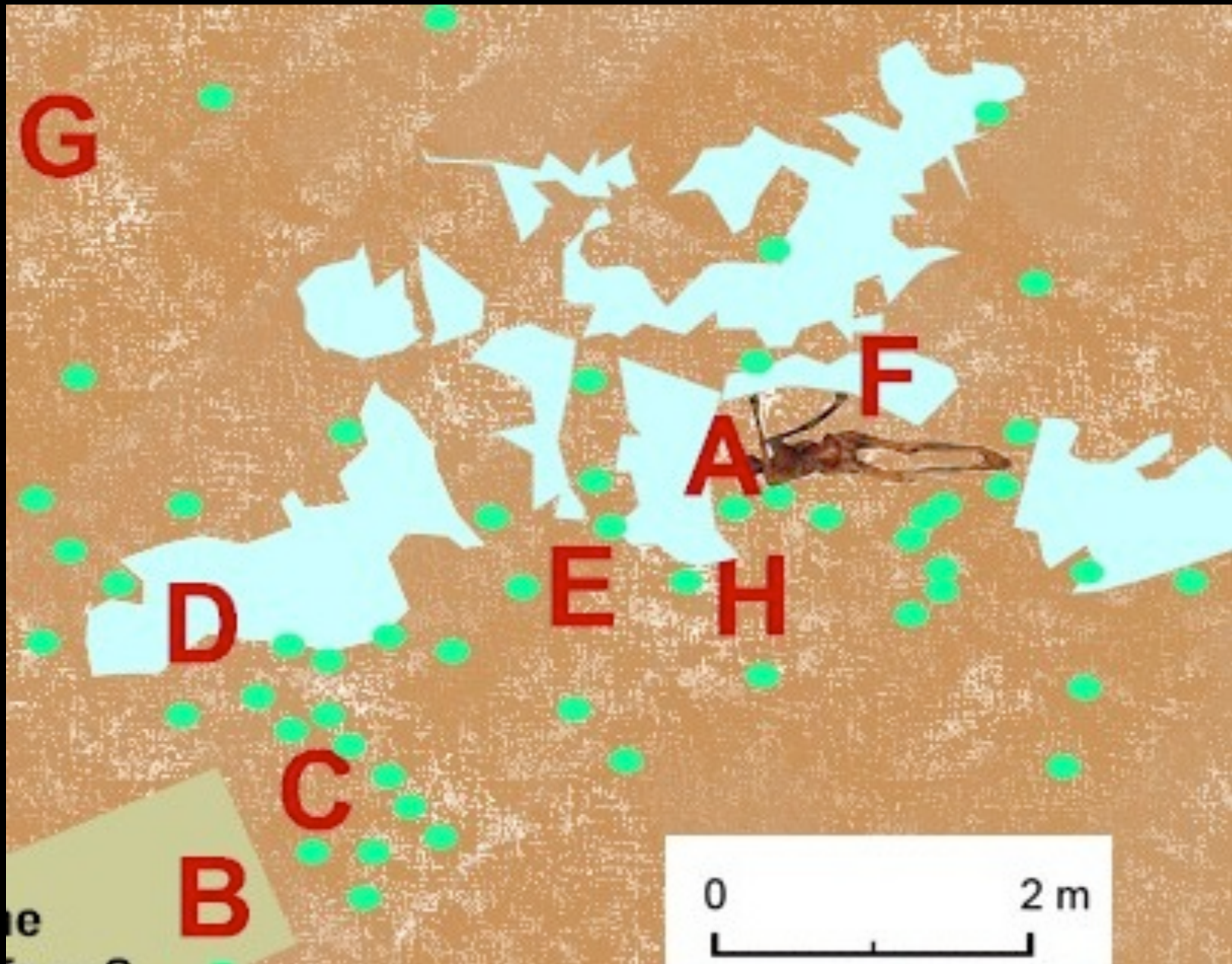
Konrad Simon's photo of Otzi in September 1991 at Similaun Pass 10,520 ft



Discovery of the Iceman “Otzi” in September 1991



Mountain rescue team thought this a modern homicide or accident at first



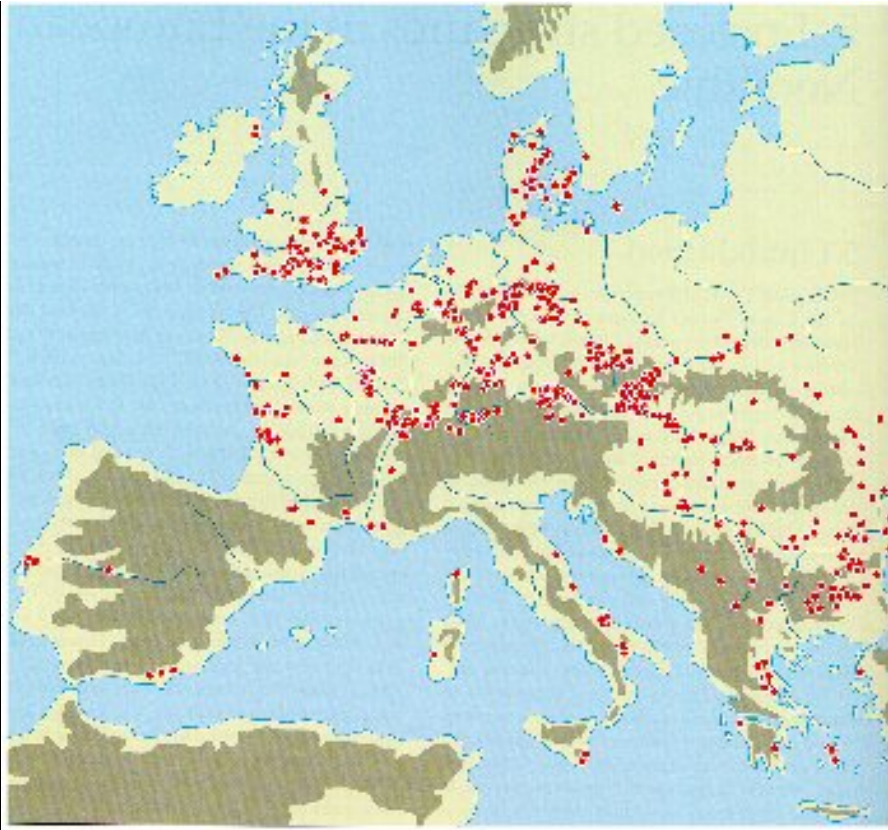
Distribution of the Iceman's tools and belongings



Teeth can determine place of birth and movement by enamel layers through REE Chemistry (Sr/Rb ratios) as geographical chemical signatures

National Geographic Magazine Image - July 2008





Neolithic Copper Mining Sites



Native Copper Nugget



Malachite



Azurite

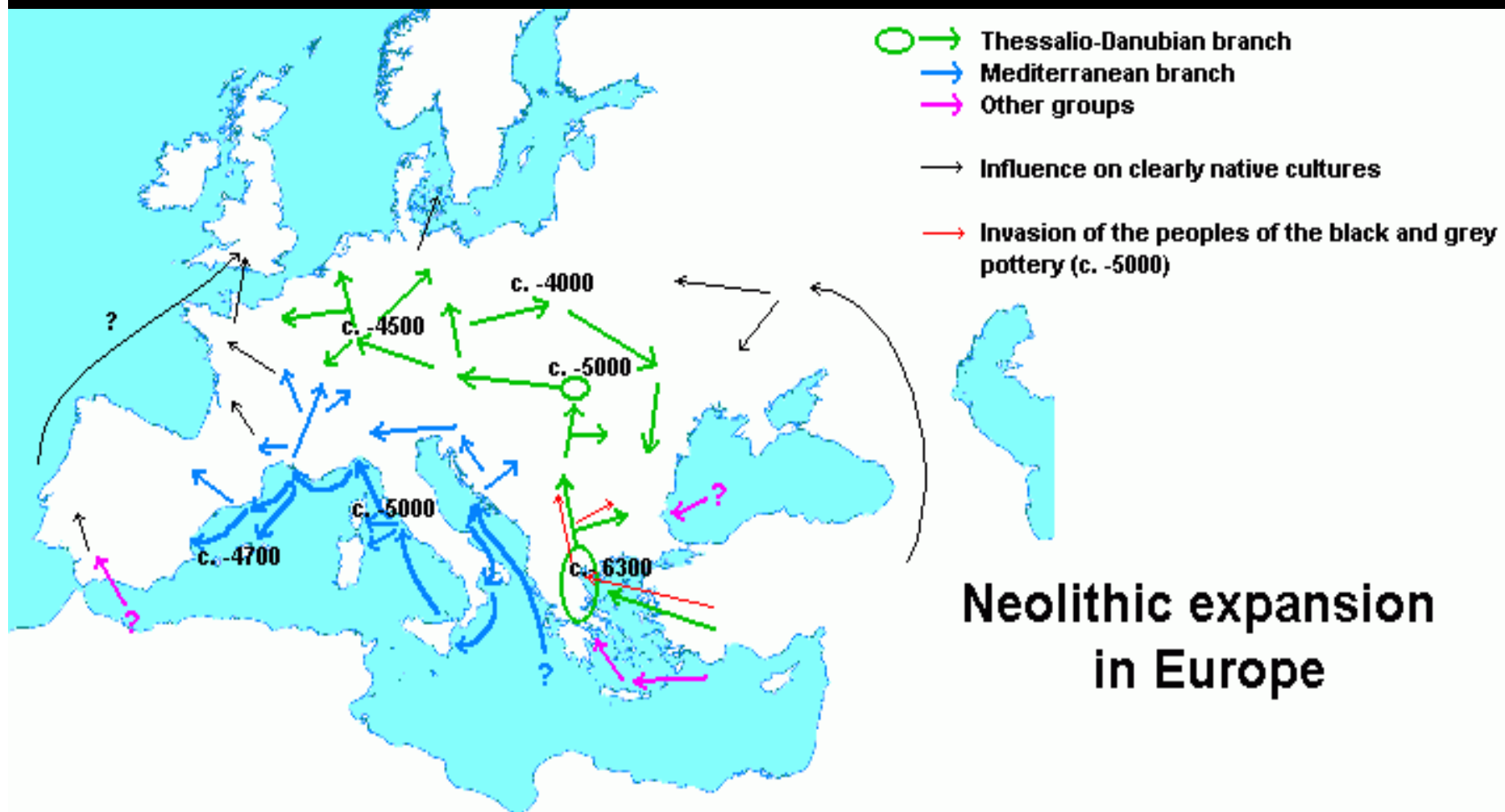


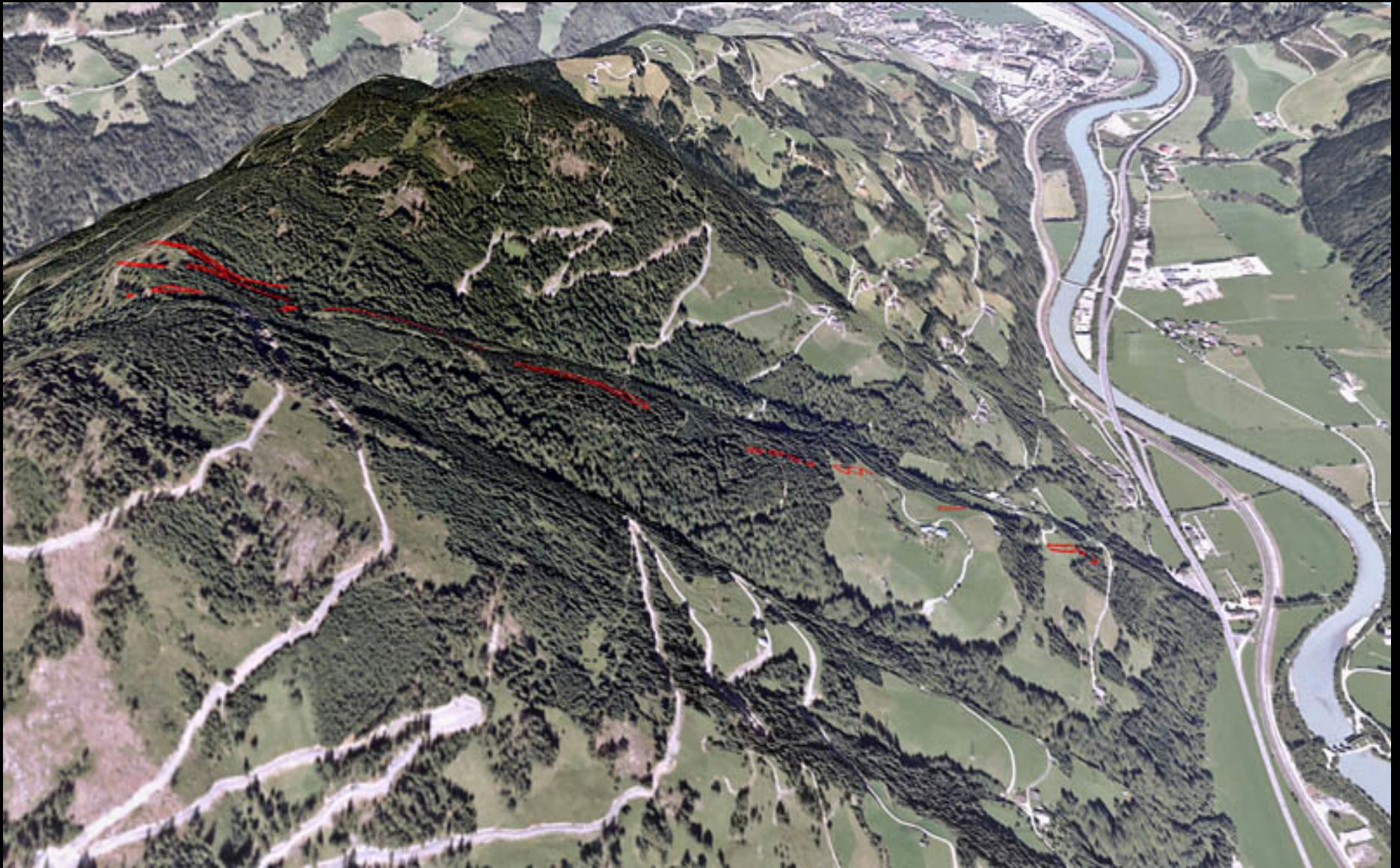
Chrysocolla



Varna Man

Varna Bulgaria
c. 4500 BCE





Mitterberg, Austria - Copper Mining Site from Copper Age c. 5000 BP
(red line = surface and other copper deposit veins mined)



Forensic team examining Iceman since 1991 include dermatologists, osteologists, paleobotanists, palynologists, radiologists lithologists, epidemiologists, archaeologists, endocrinologists, DNA biologists, etc.











Sud-Tirol Museum Bolzano







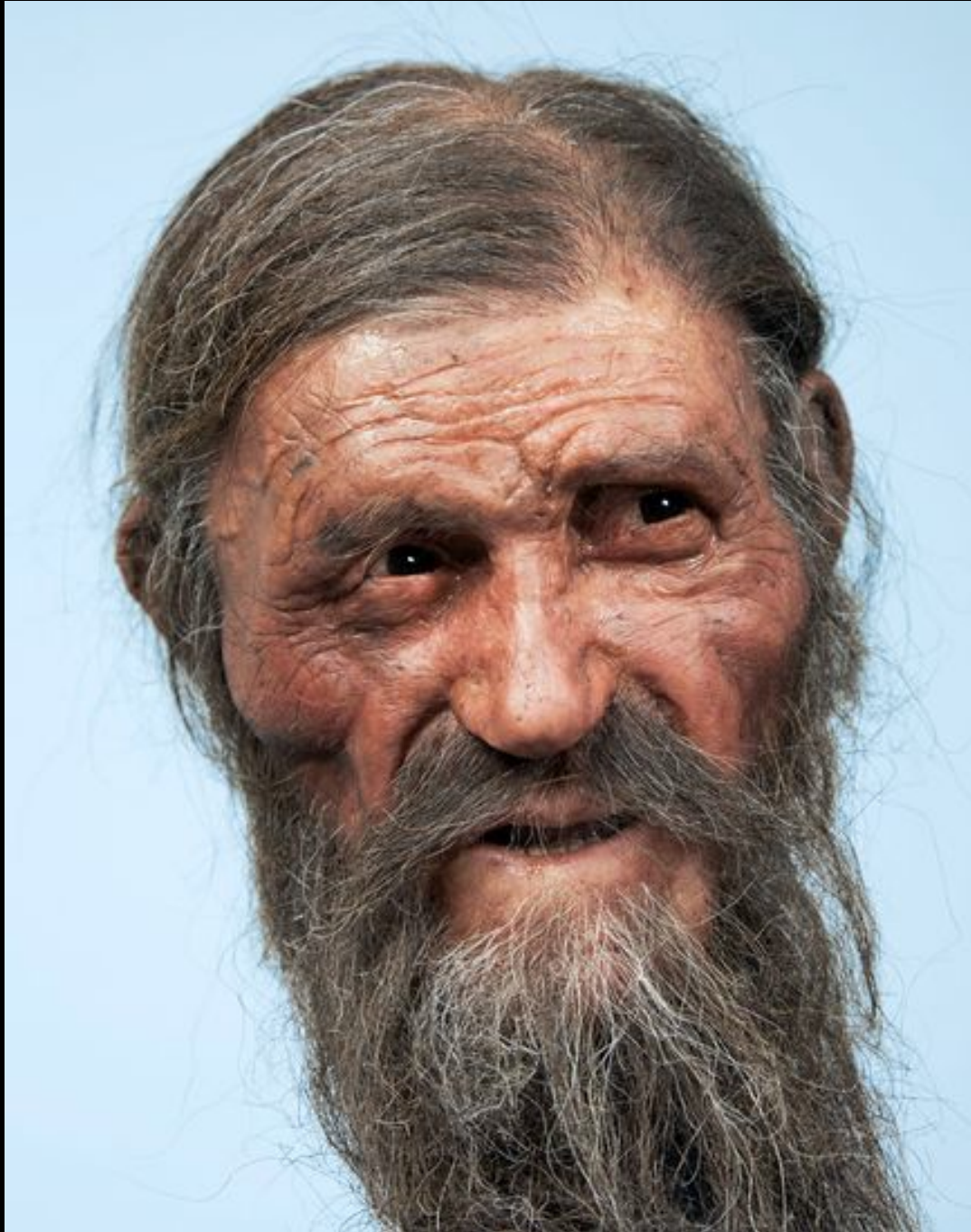


Reconstruction
circa 1994





2000



2010

Otzi

was around
45 years old
at death





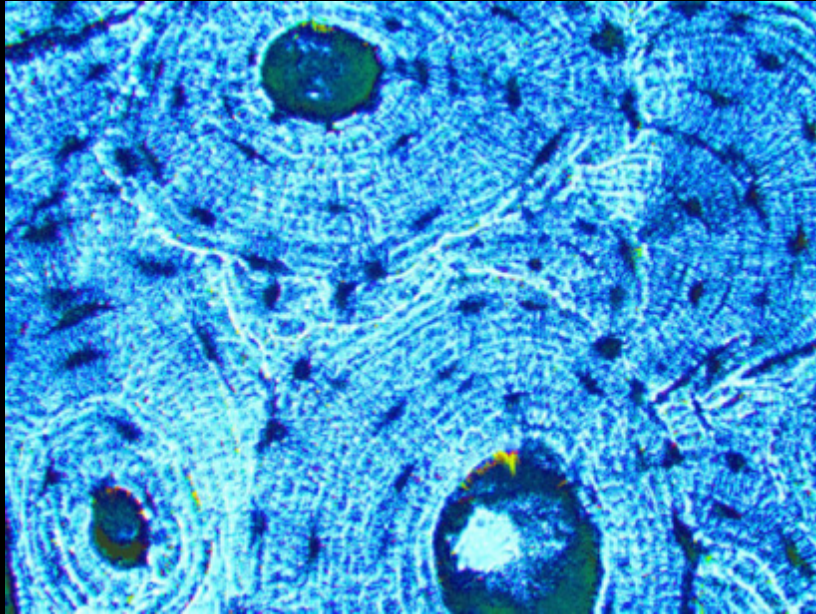


Patrick Hunt photos Bolzano Museum 2011





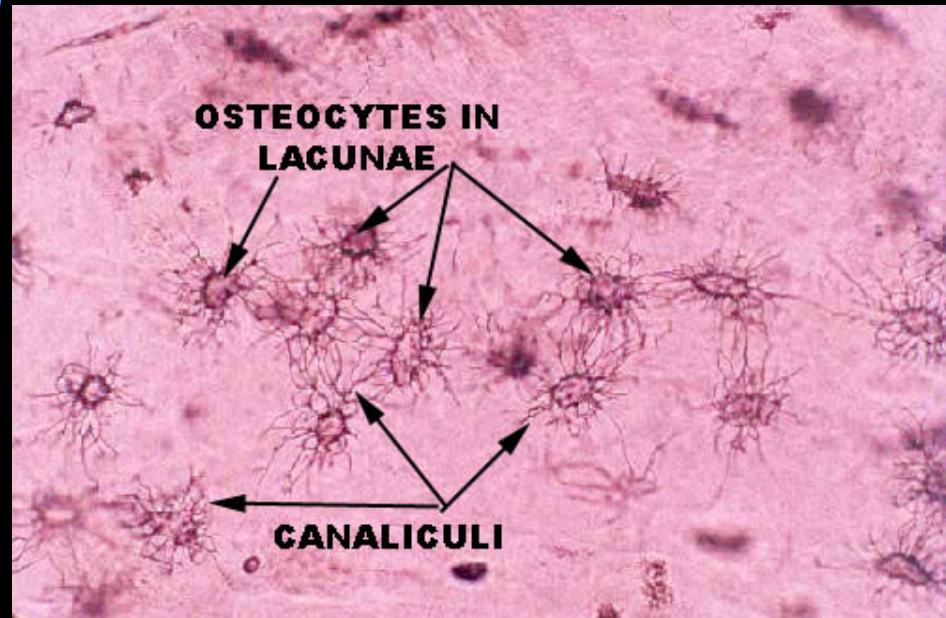
Dr. Patrick Hunt
Dr. Annaluisa Pedrotti

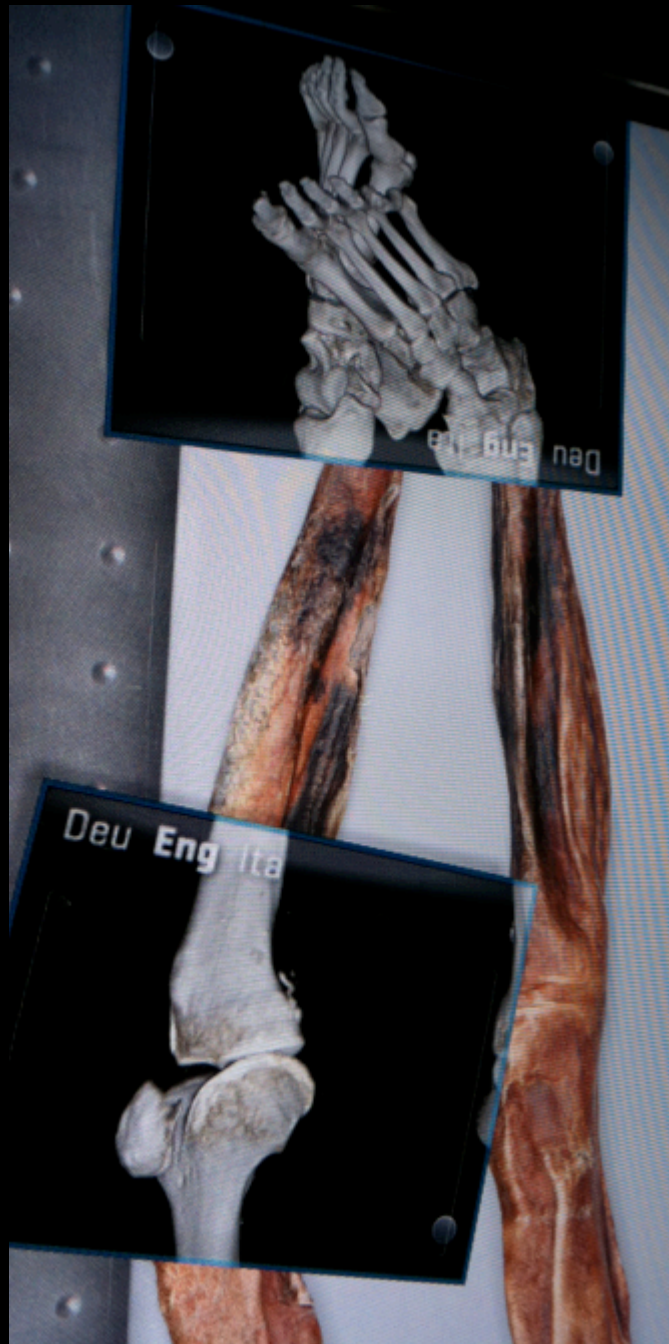


Human Osteocytes

30 year old bone

70 year old bone





Arthritis and hammertoe





Birchbark
bucket



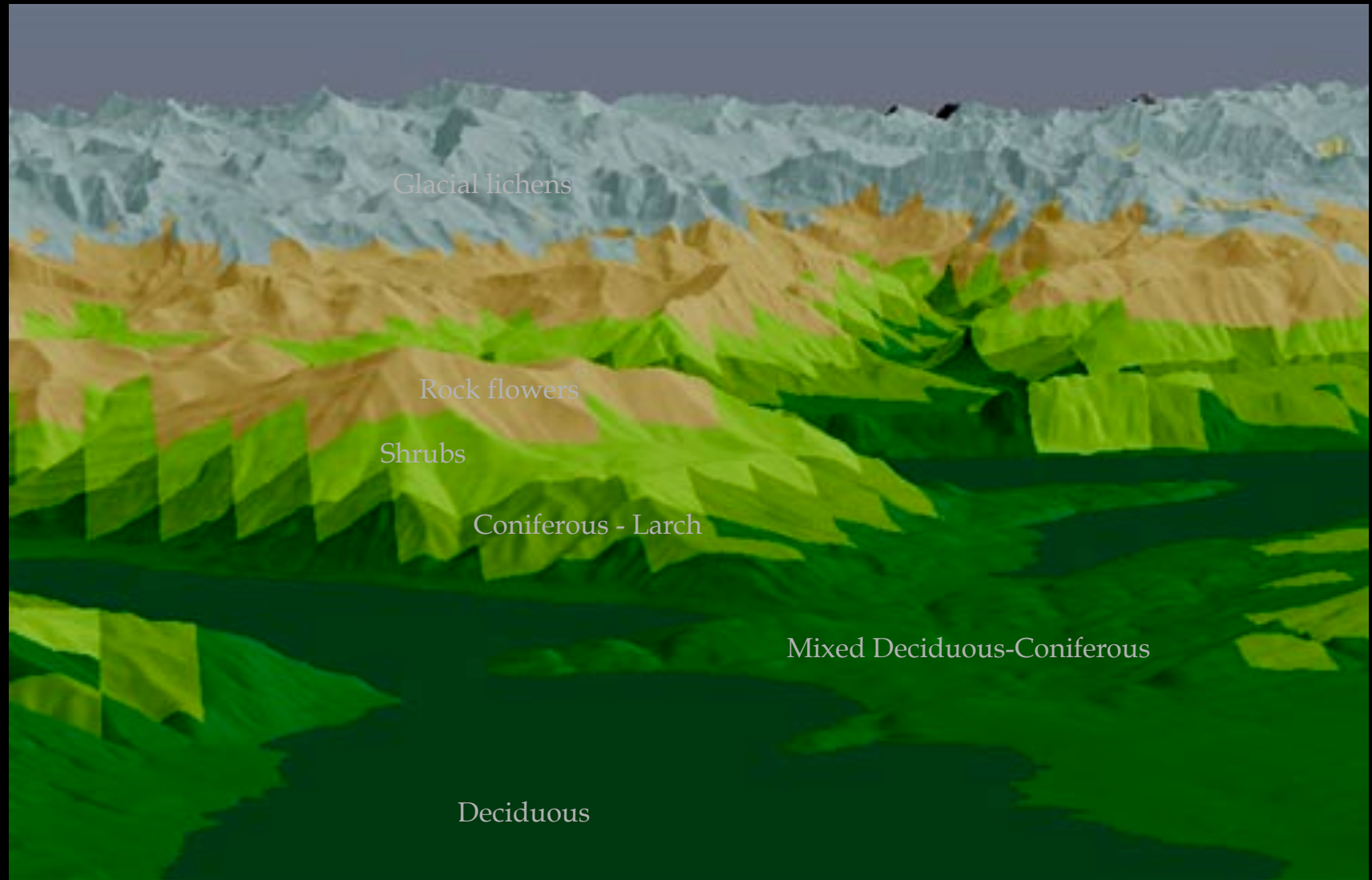
Otzi's gear from the back

National Geographic Magazine Image - July 2008



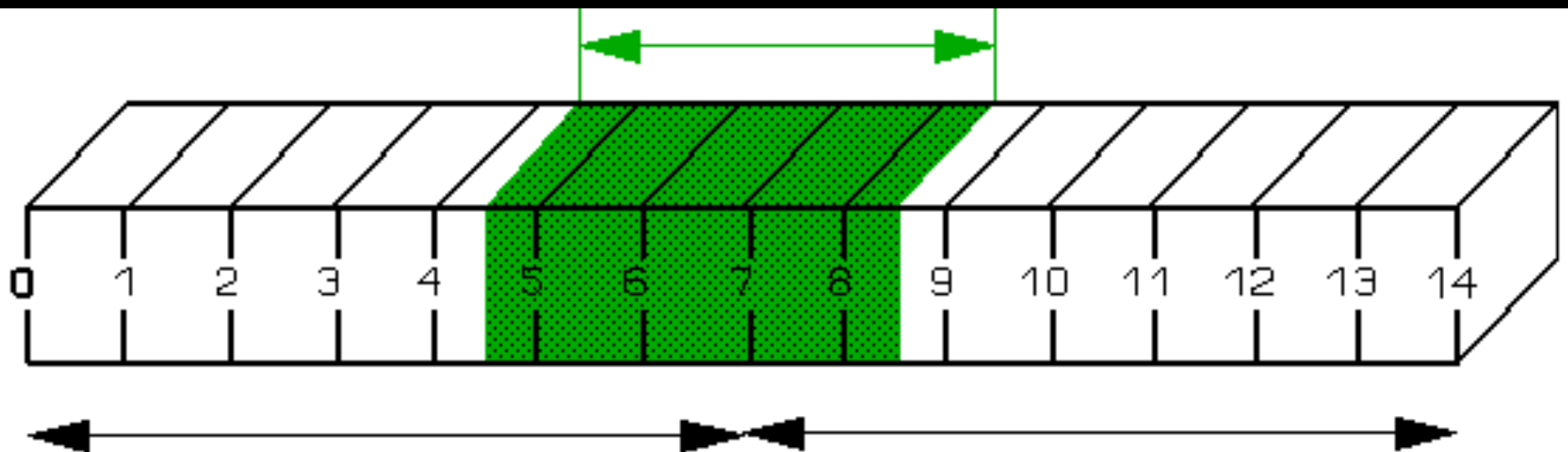


Carpinetum orienalis (hornbeam) pollen found on Iceman's clothes and stomach; layers interspersed with fir and larch pollen – a forensic puzzle at first



500-900 m 900-1300 m 1300-1900 m 1900-2400 m 2400-3000 m

pH Scale - 0-14



Wild Mountain Azalea
Pas de la Coche, Savoie
2000 m
prefers acidic rock 5-6 pH



Parc National de Vanoise Savoie Mont Cenis
Mountain Juniper
1800 m prefers alkali/basic rock 8 pH

Satellite fixing of GPS coordinates of find spot settle international dispute



A₁

Ex: 000001

OET

M

Se: 000002/2

Acc

Im: 000011/20

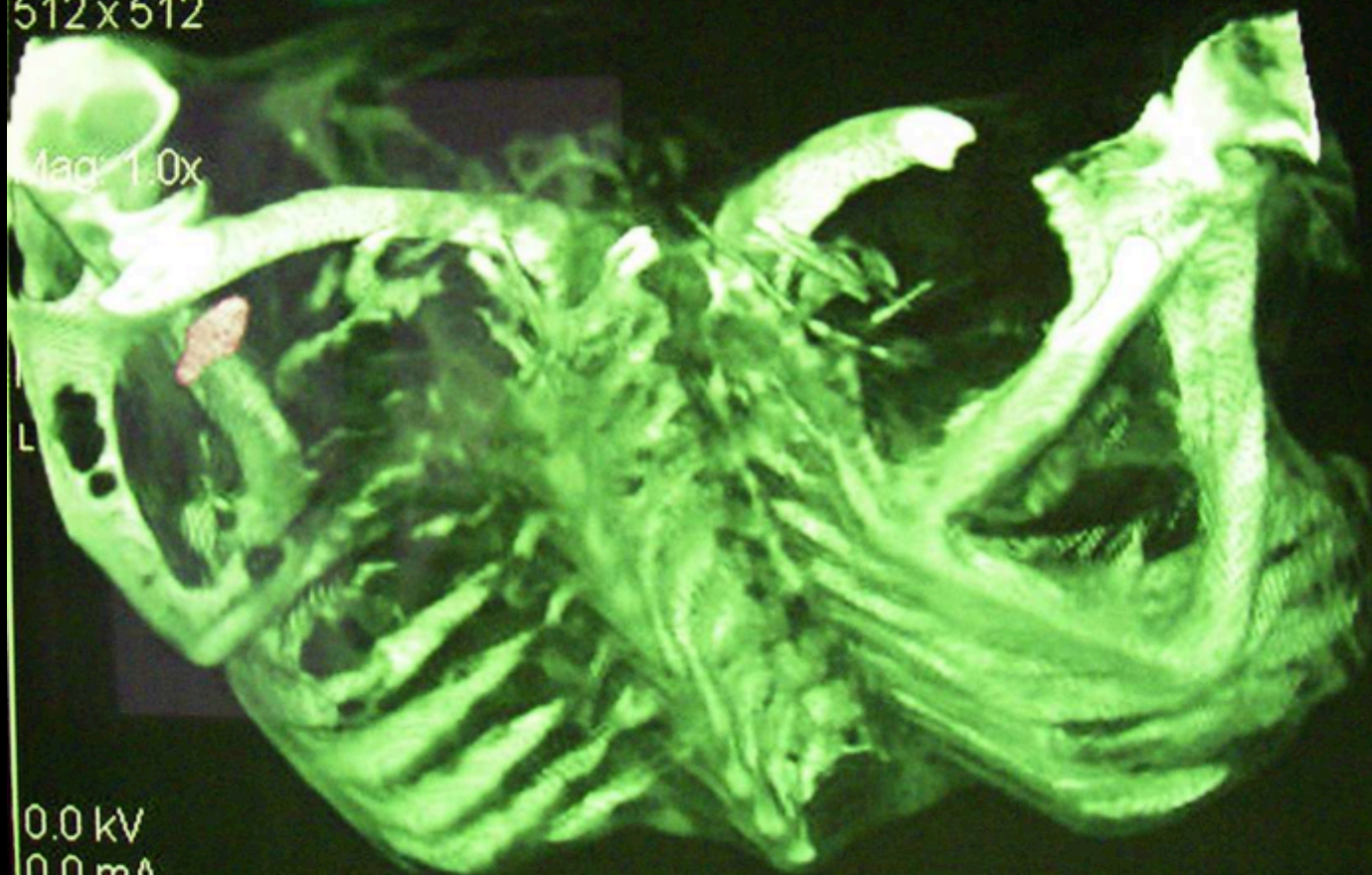
2001 Jul 1

: 0.0

512 x 512

IXI

Mag: 1.0x



Imaging
Since 1998

X-Radiography
CAT

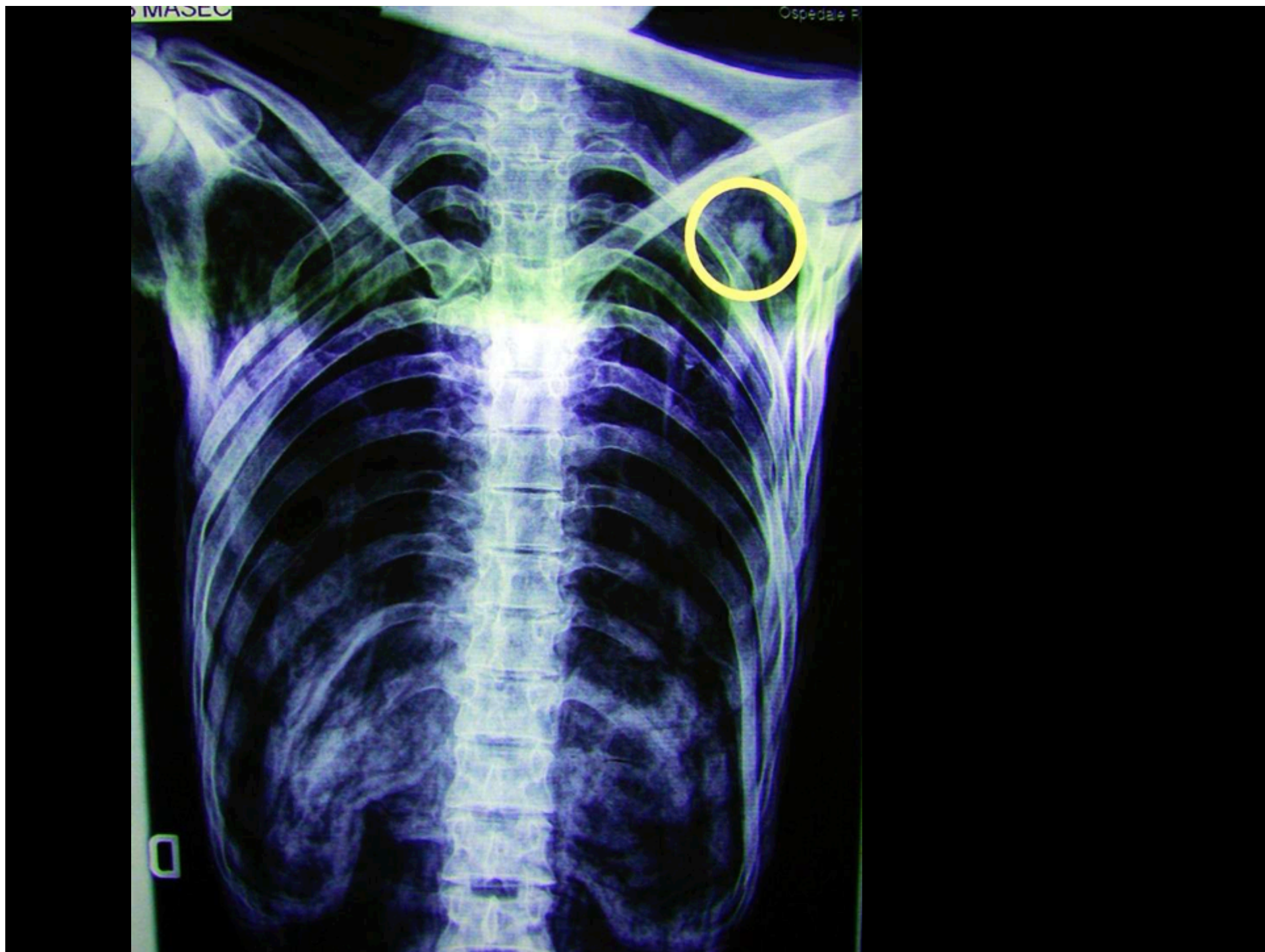
0.0 kV

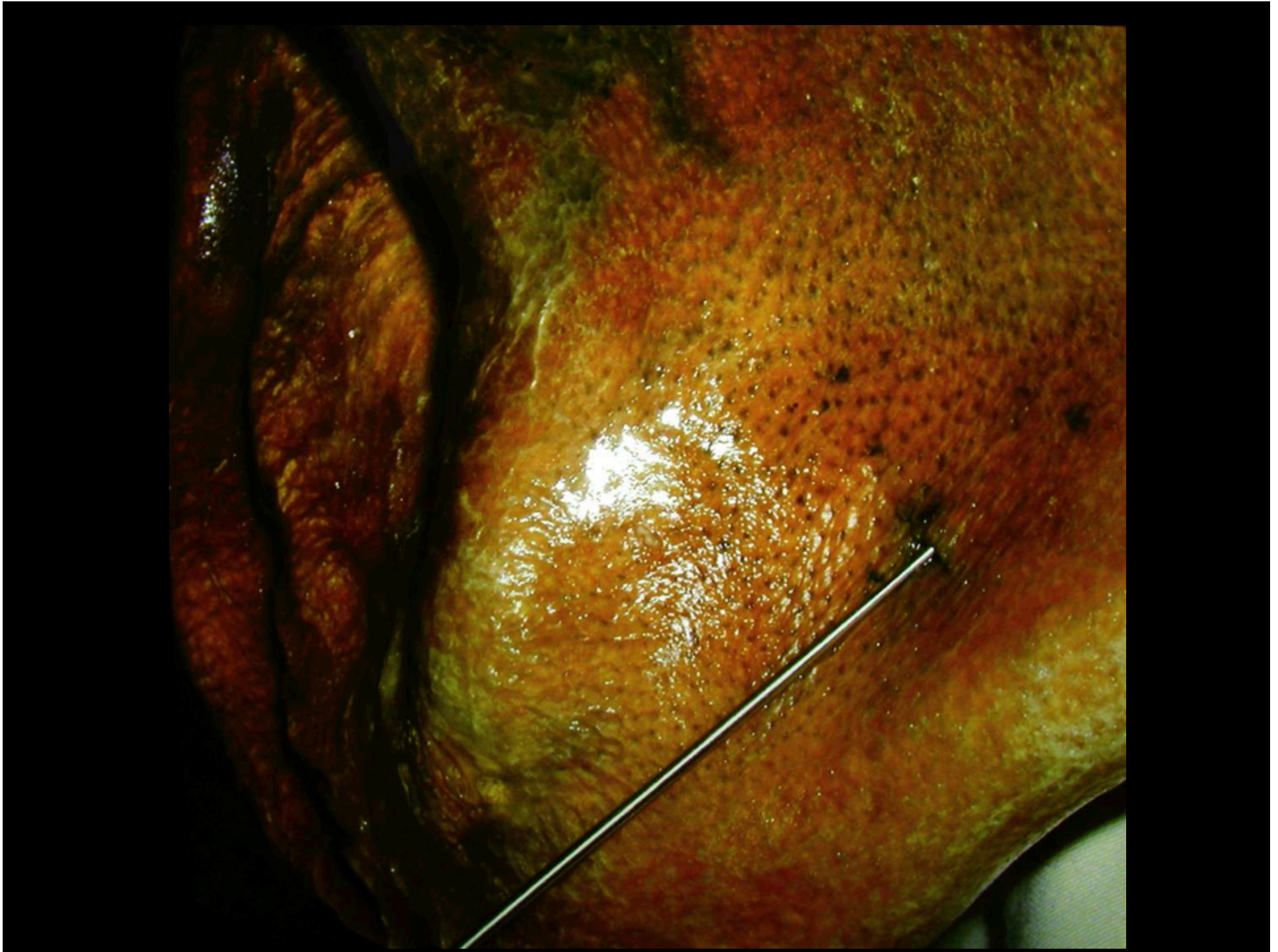
0.0 mA

Tilt: 0.0

0.0 s

W: 275 L: 106







Otzi' s tattoos



Otzi' s Tattoos



Otzi's Precious
Copper Axe

(CuAS)



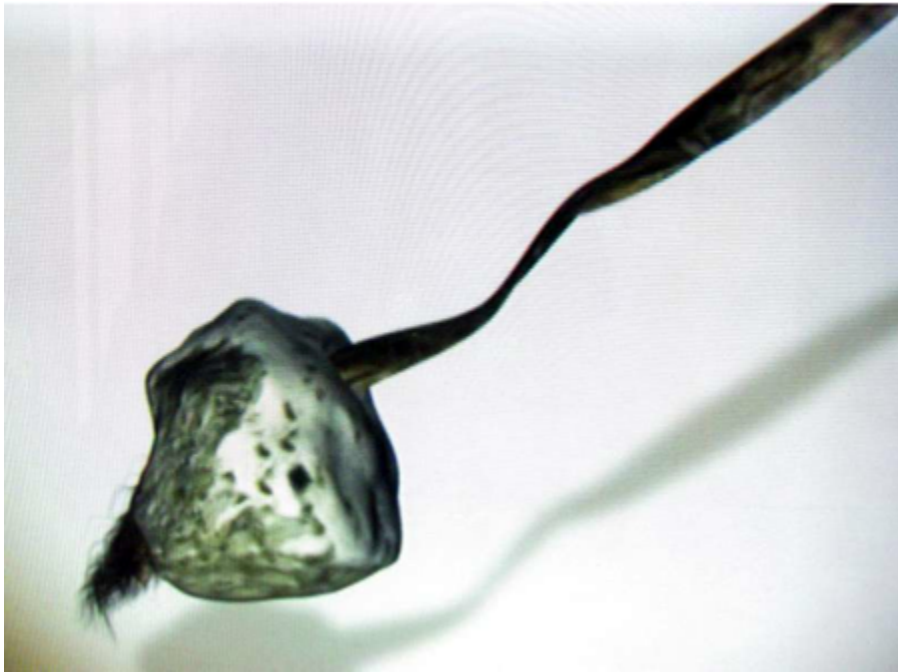
Copper smelting and pouring in stone mold





Shoe reconstruction

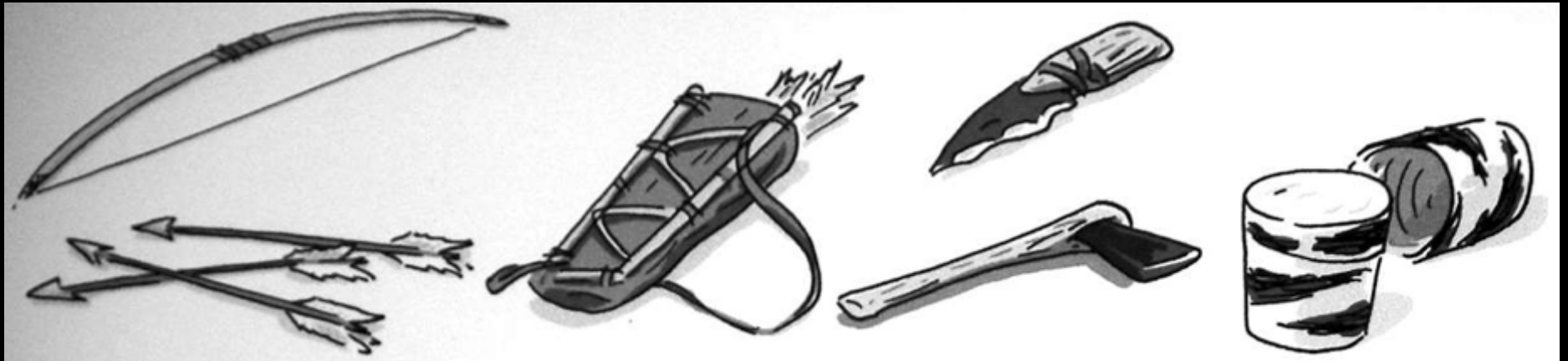




Fomes fomentarius (tinder fungus)

Iron pyrites for sparks





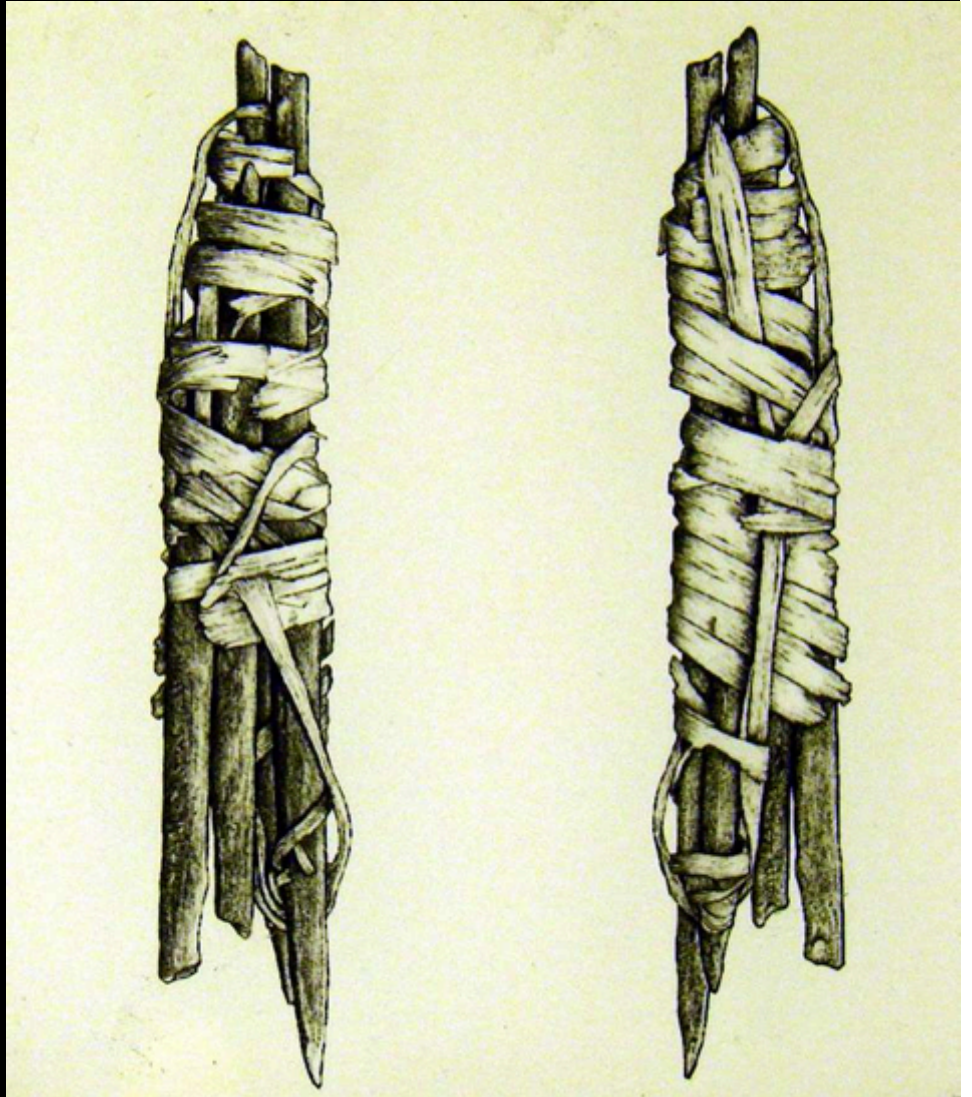
Otzi' s Gear

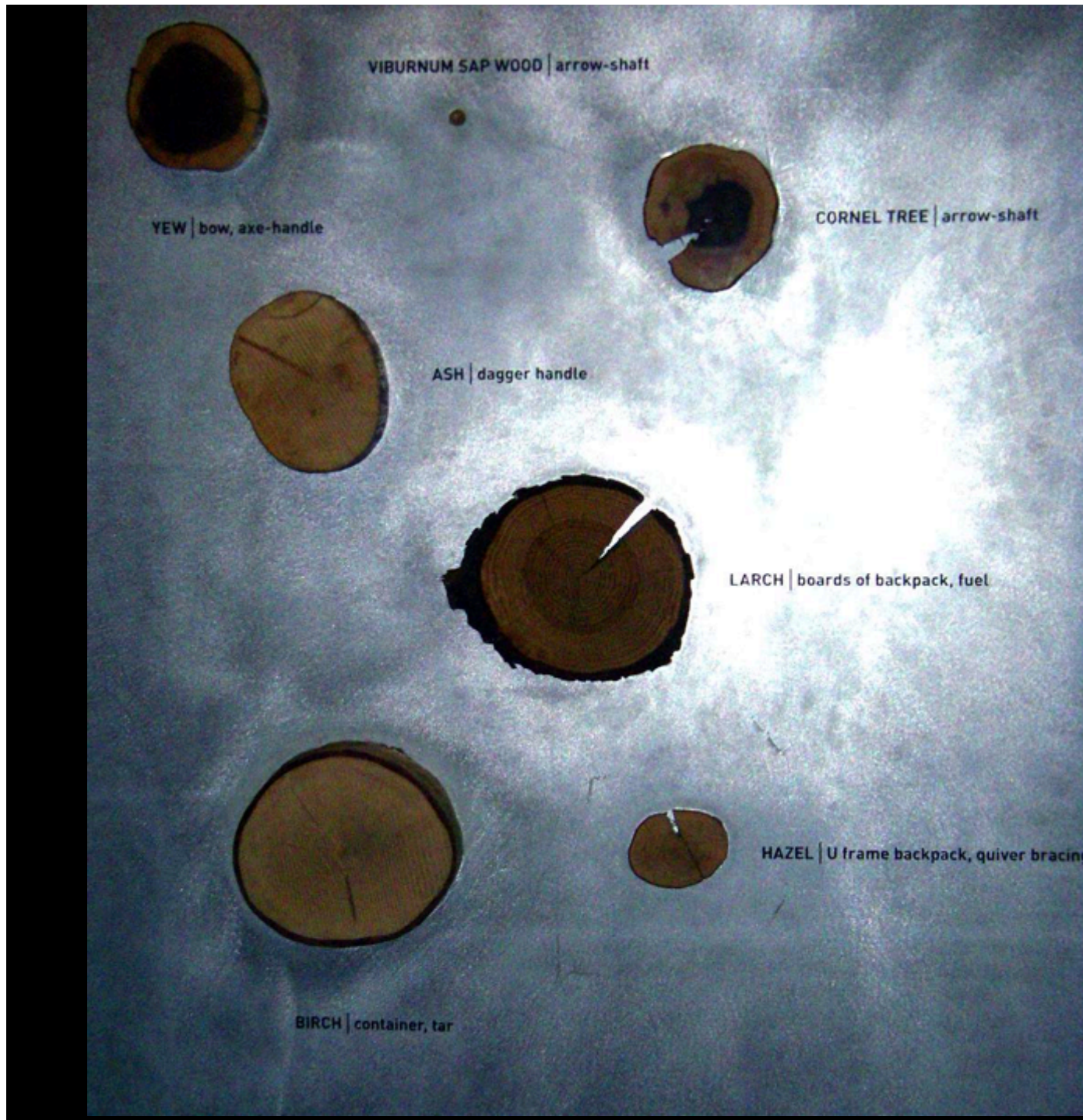


Flint knife



Deer antler points for dressing stone tools





Sophisitcated
wood producrs

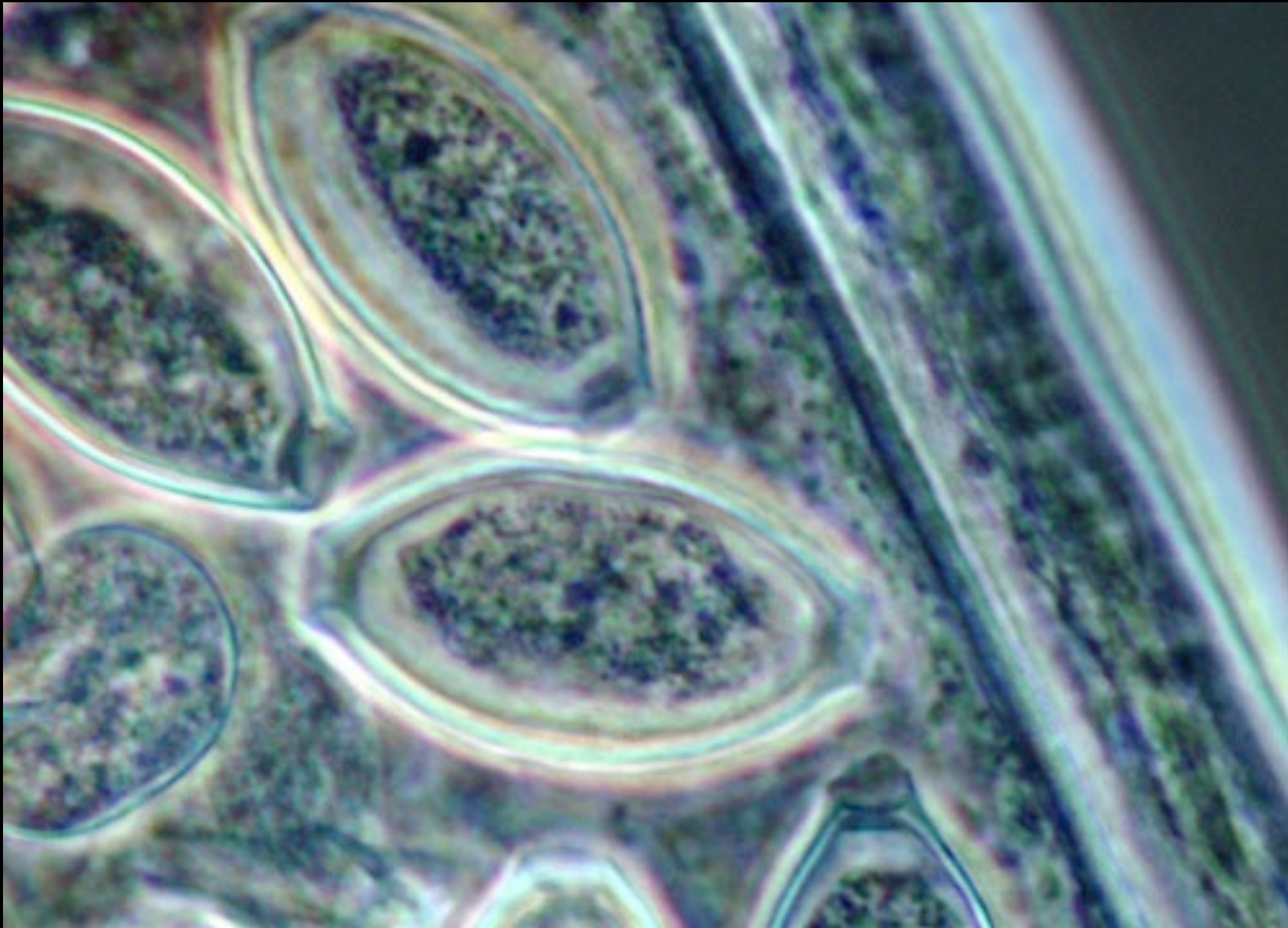


Carried
Bracket fungus?

Why?

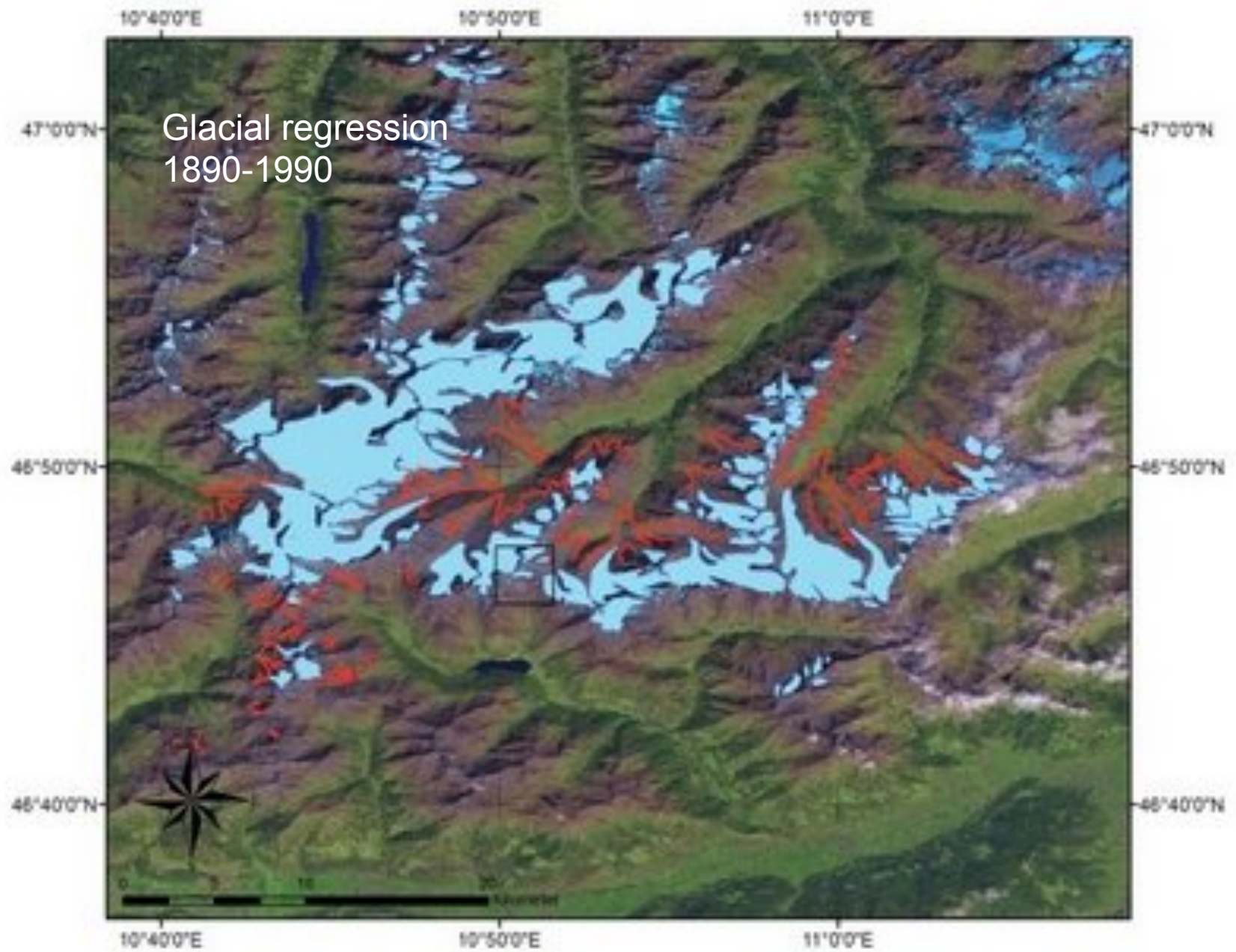


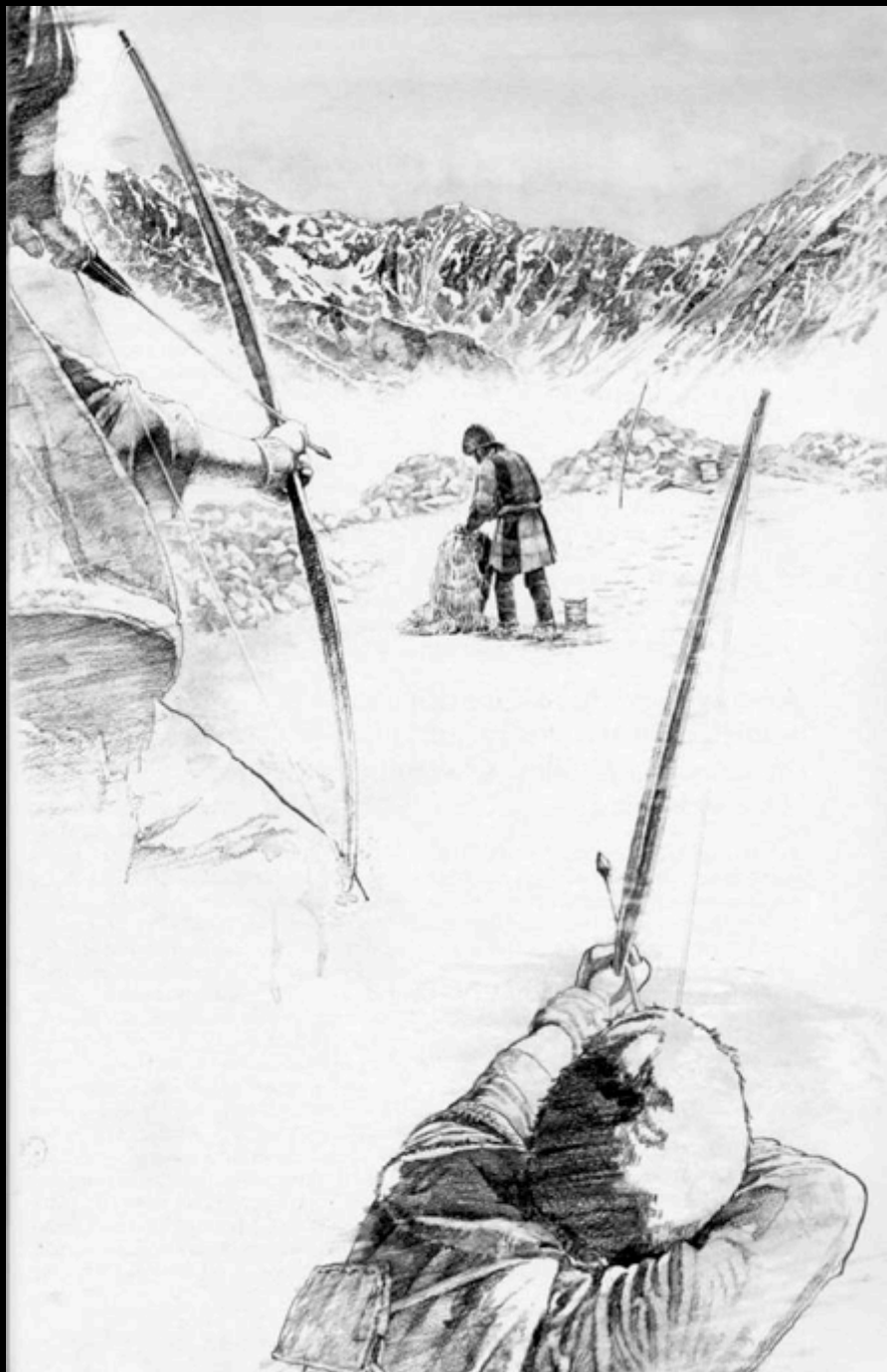
Piptoporus betulinus Birch tree Bracket fungus



Trichuris trichuria whipworm

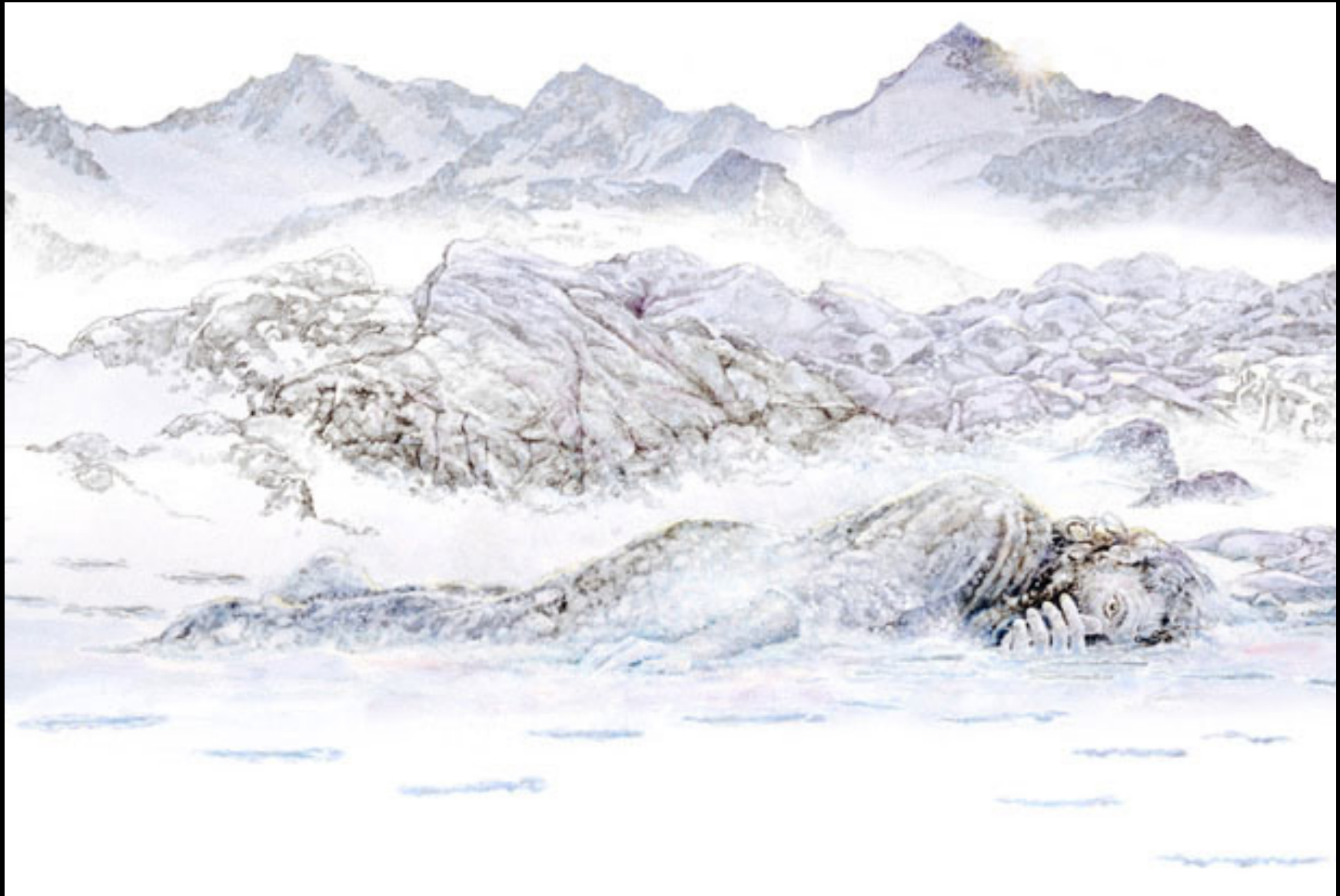
Glacial regression
1890-1990







We now know by blood clotting chemical traces (*fibrin*) on his arrow wound that he died quickly.



Otzi's
5300 year old
mtDNA
reveals what?

2005-2010 studies

mitochondrial DNA
8% European
population =
Haplogroup K

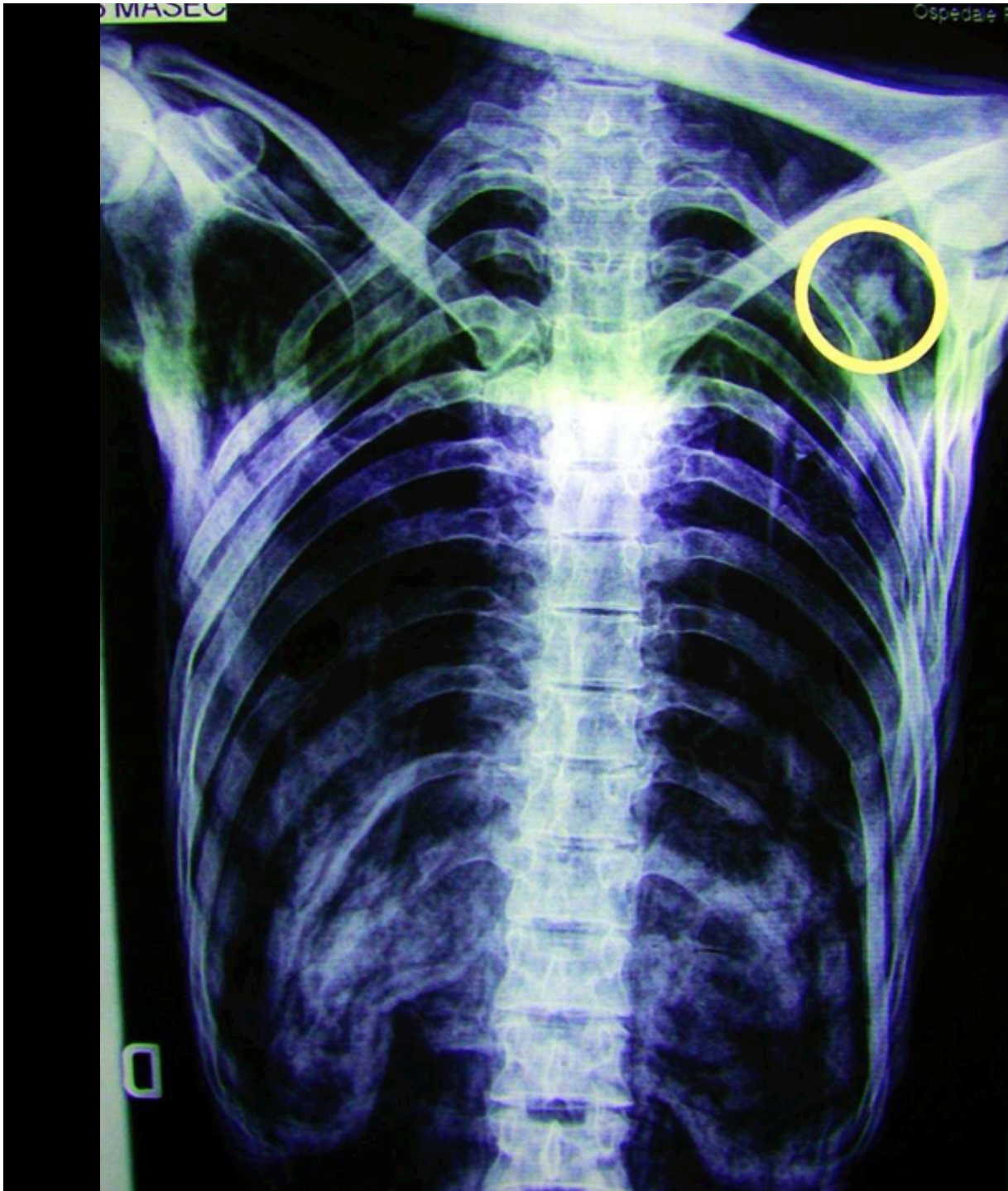
K-1 K-2

Subhaplogroups
K-1a K-1b K-1c

K-1Ö
(unique, no known
descendants)



Some of Otzi's
red blood cells
have been isolated
and identified (the oldest
known blood cells)
by Dr. Albert Zink
in Bolzano.



New Scientific Aim: (Stone Provenance)

If I can get a geochemical signature on the embedded flint arrowhead, and can then Match it to a flint source in either Italy or Austria, I can work out some fairly high statistical probability of whether Otzi was killed by people on which side of the mountains, either “friendly” fire from his own Mediterranean culture or the Danubian culture.



Ötzi the Ice Man 5300 years old CSI Forensic Archaeology

