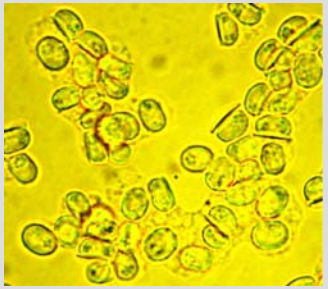
CERATOCYSTIS PLATANI: AN INVASIVE FUNGAL PATHOGEN THREATENING NATURAL POPULATIONS OF ORIENTAL PLANE IN GREECE

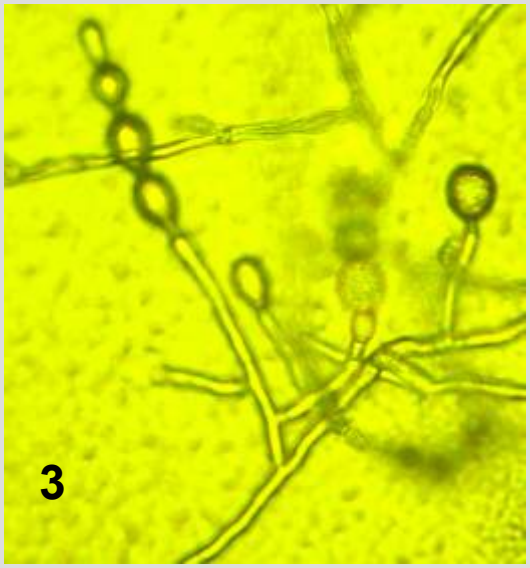


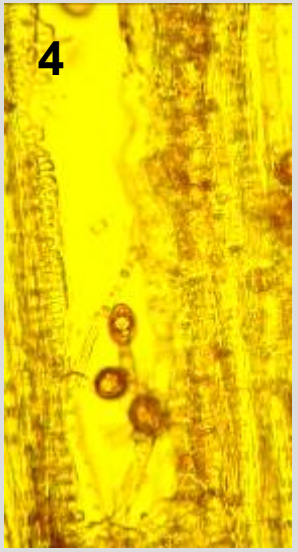
Nikoleta Soulioti[1,2], Panaghiotis Tsopelas[1] and Stephen Woodward[2]

[1]NAGREF- Institute of Mediterranean Forest Ecosystems, Athens, Greece
[2]University of Aberdeen, School of Biological Sciences, Department of Plant and Soil Science, Scotland, UK

BACKGROUND

- **Causal organism: *Ceratocystis platani* (≡*C.fimbriata* f.sp. *platani*)**
- **Fatal fungal disease of genus *Platanus***
- ***C. platani* is an alien invasive species in Europe (thought being native to the USA)**





1. Perithecia, 2. Ascospores, 3. Aleurioconidiophores and aleurioconidia, 4. Aleurioconidia inside xylem vessels

Host species affected:

***Platanus* spp.**

***Platanus occidentalis* L. (American sycamore)** eastern North America

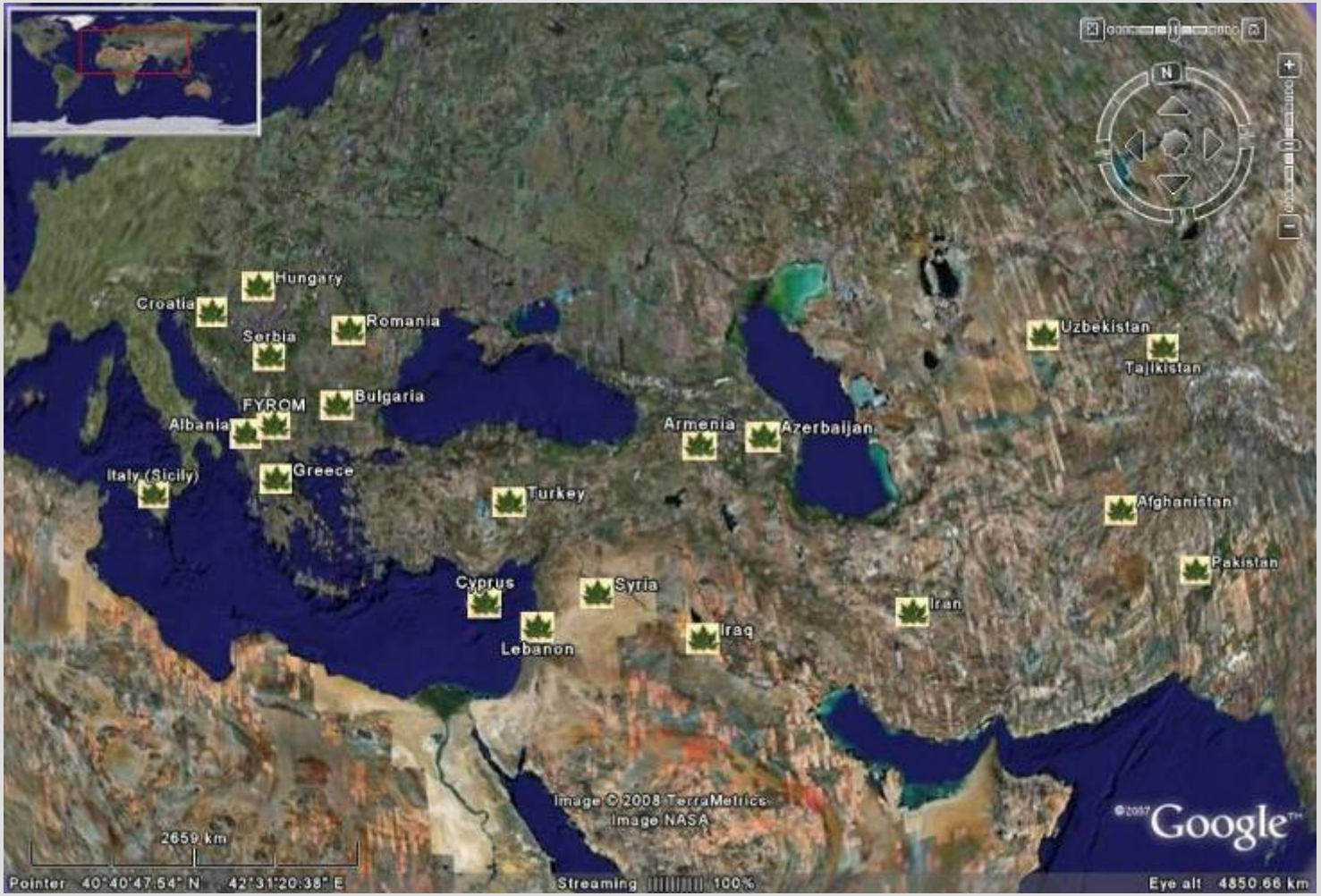
***Platanus acerifolia* Ait. (Willd.) (London plane: natural hybrid of *P. orientalis* x *P. occidentalis*)**

***Platanus orientalis* L. (Oriental plane)**

***Platanus racemosa* Nutt. (California sycamore)**

http://www.chengappa.demon.co.uk

Platanus orientalis: geographical distribution



Infection facts:

Ceratocystis platani **is a wound parasite.**

- **Even a very small wound is enough for a successful infection.**
- **The wound-exposed tissue is colonised by *C. platani* immediately on contact.**
- **After wound colonisation, mycelium develops both longitudinally and tangentially into conducting tissues of the underlying sapwood.**
- **Colonisation can be 2,0-2,5 m/year from a single infection.**
- **Trees of 30 - 40 cm diameter may die within 2-3 years of infection.**
- ***C. platani*** **can survive for several years at -17°C but will not grow below 10°C or above 45°C.**
- **Optimum temperature for development is 25°C. There is apparently no incubation period.**
- **The fungus can survive for >105 days in soil during winter, but is killed by temperatures of 35-40°C (Accordi, 1989).**

Geographical distribution of the disease:

North America

USA (Arkansas, California, Delaware, District of Columbia, Kentucky, Mississippi, New Jersey, New York, North Carolina, West Virginia, Pennsylvania, Tennessee, Virginia)

Europe

France, Italy, Switzerland, Greece

Belgium,Spain, and Serbia* (unconfirmed)

Asia

Iran

Armenia* (unconfirmed)

Origin of the pathogen

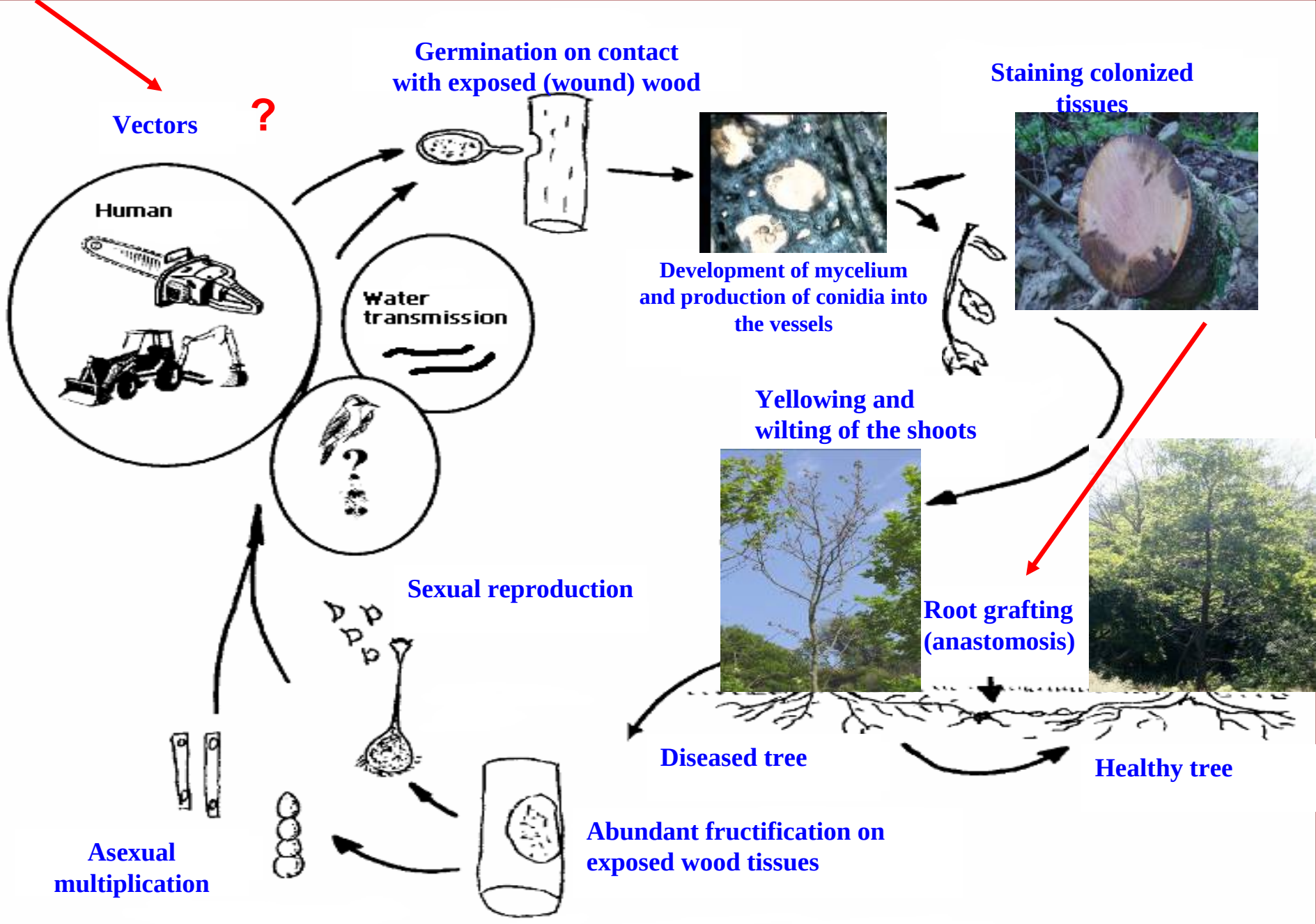
Ceratocystis platani **is probably indigenous to the SE USA and perhaps Mexico (Engelbrecht & Harrington 2005).**

Gene flow estimates suggest that both the European and Californian populations were derived independently from different populations in the eastern United States (Engelbrecht *et al.*, 2004).

Therefore, the pathogen is alien to Europe.

Invasion in Europe

(CAT)5 and Hαelll fingerprinting indicated that the Greek population of *C. platani* was identical to other European populations, which probably resulted from a single introduction from the USA to Naples in World War II (Ocasio-Morales *et al.*, 2007).

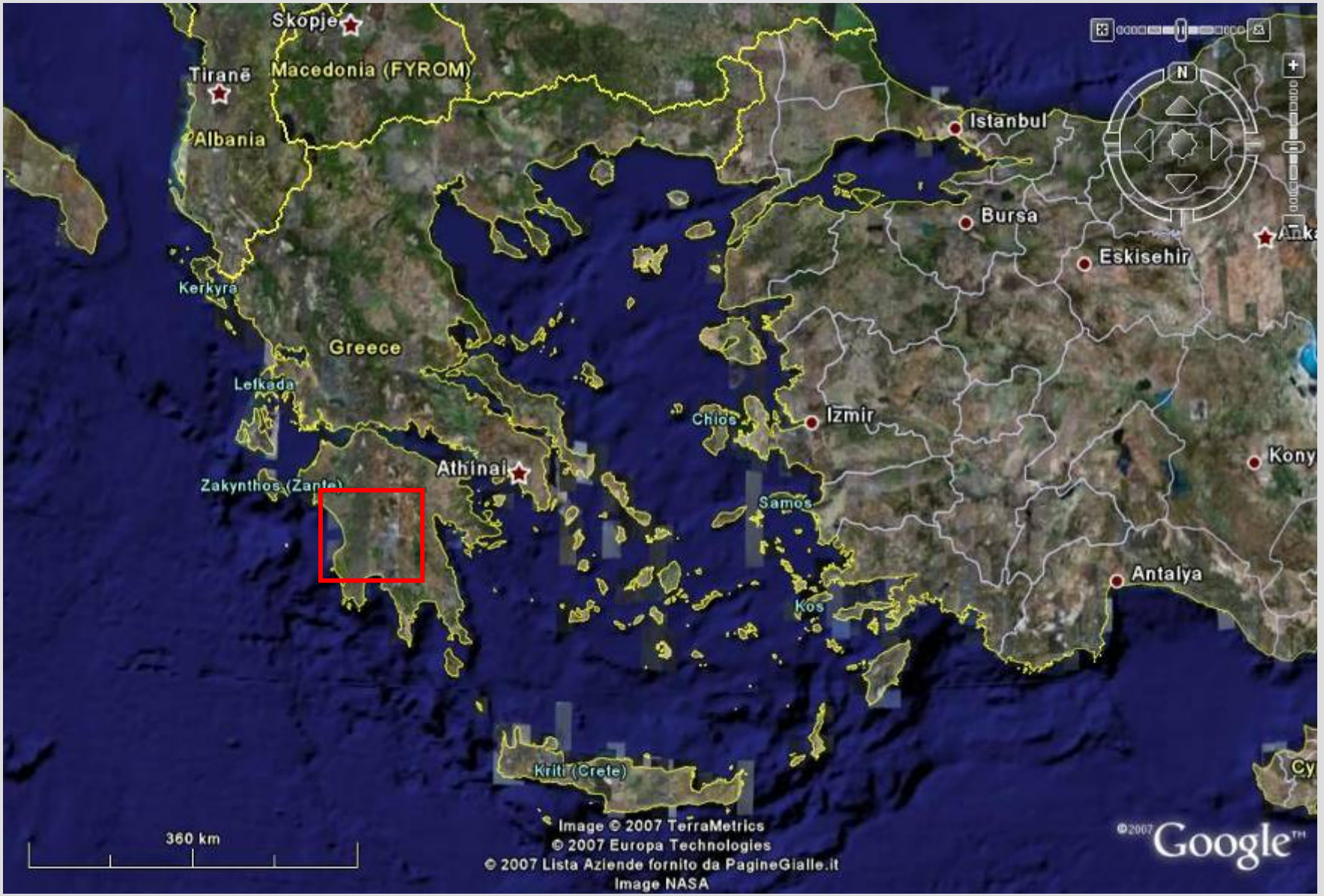


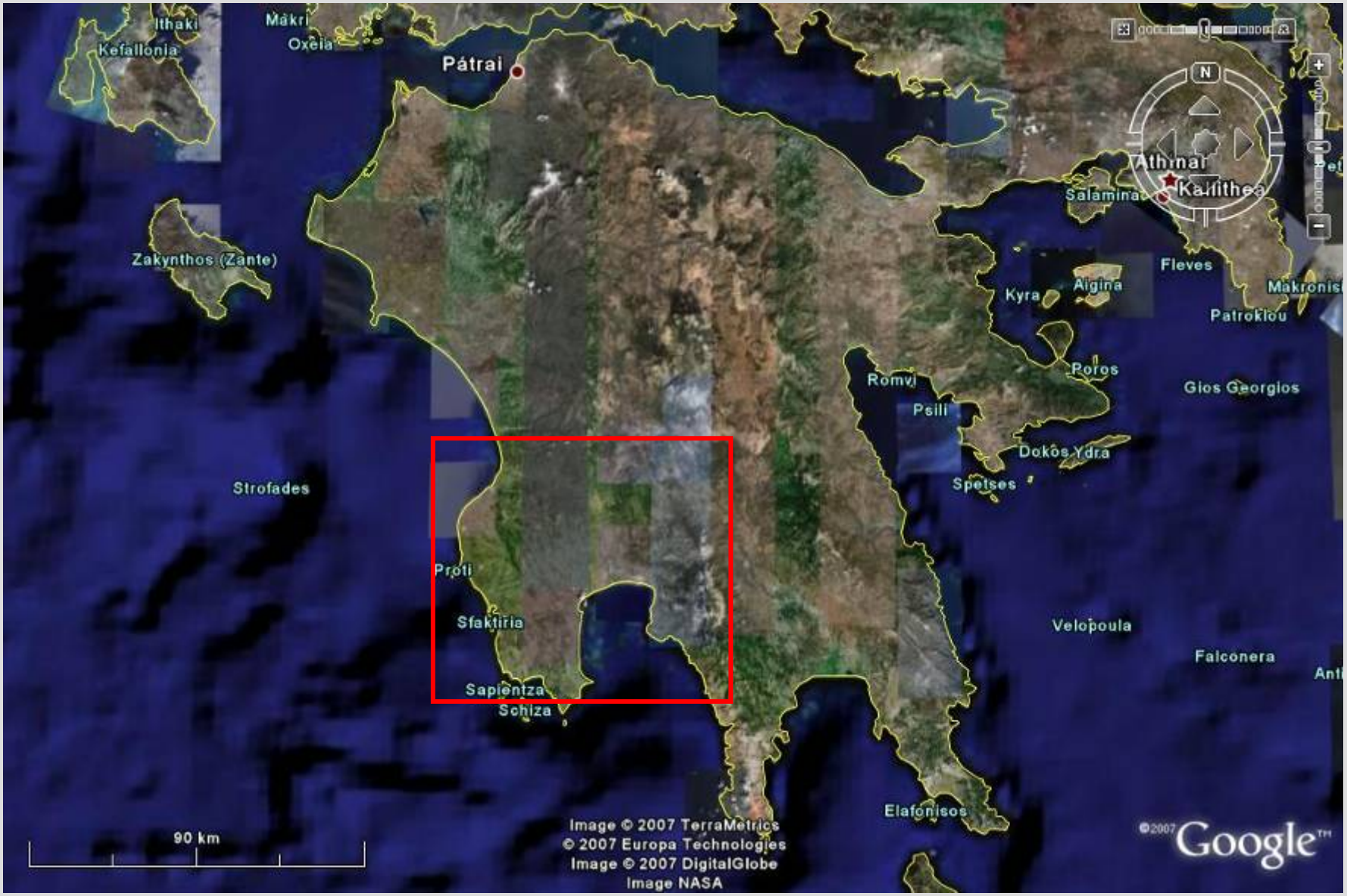
DISEASE CYCLE OF *CERATOCYSTIS PLATANI*

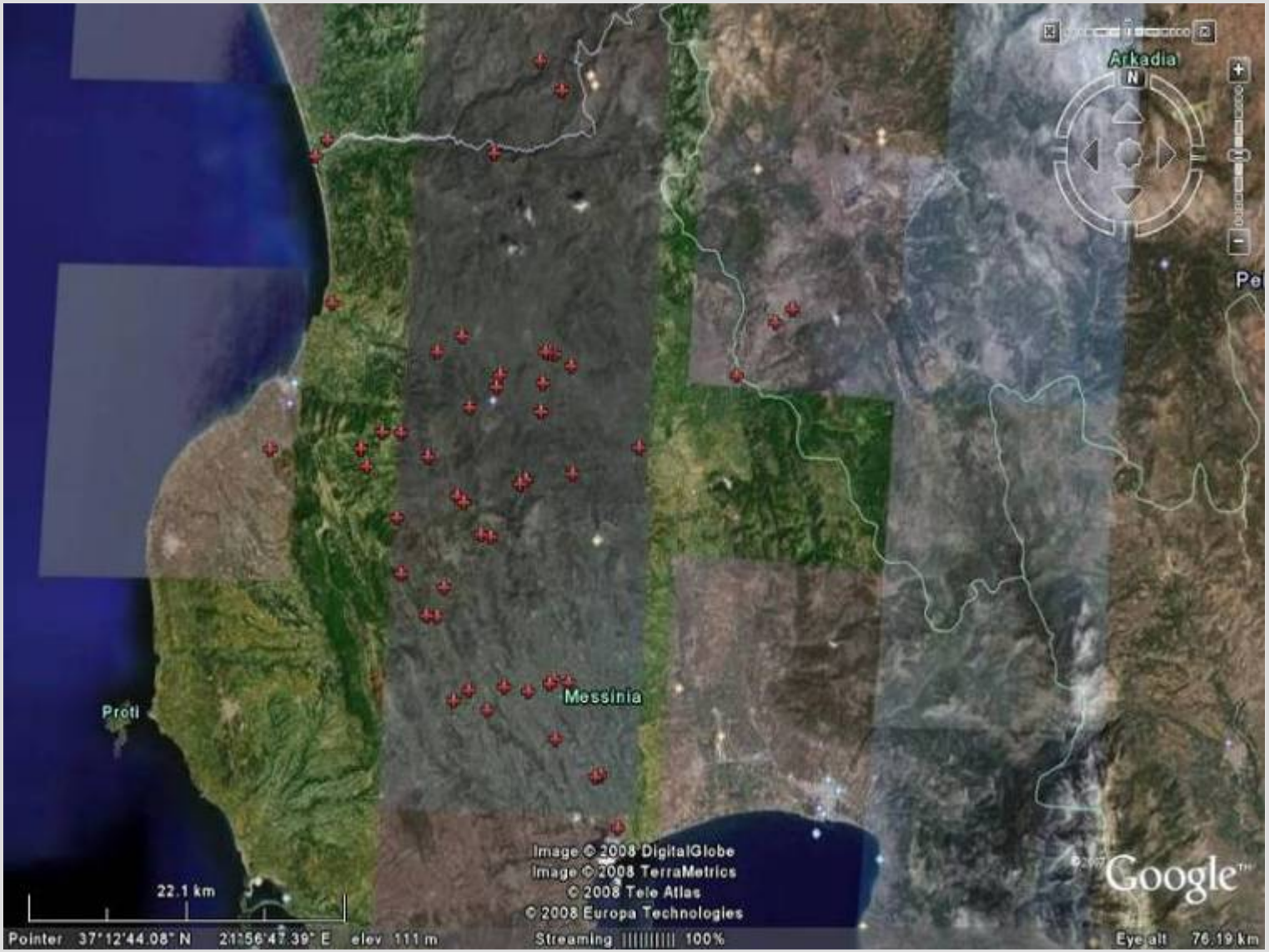

Belgium
Switzerland
France
Spain
Italy
Greece
Armenia
Iran
Image NASA
Image © 2008 TerraMetrics
© 2008 Cnes/Spot Image
2737 km
Pointer 45°28'06.51" N 26°35'07.15" E
Streaming 100%
Eye alt 4885.57 km
Google

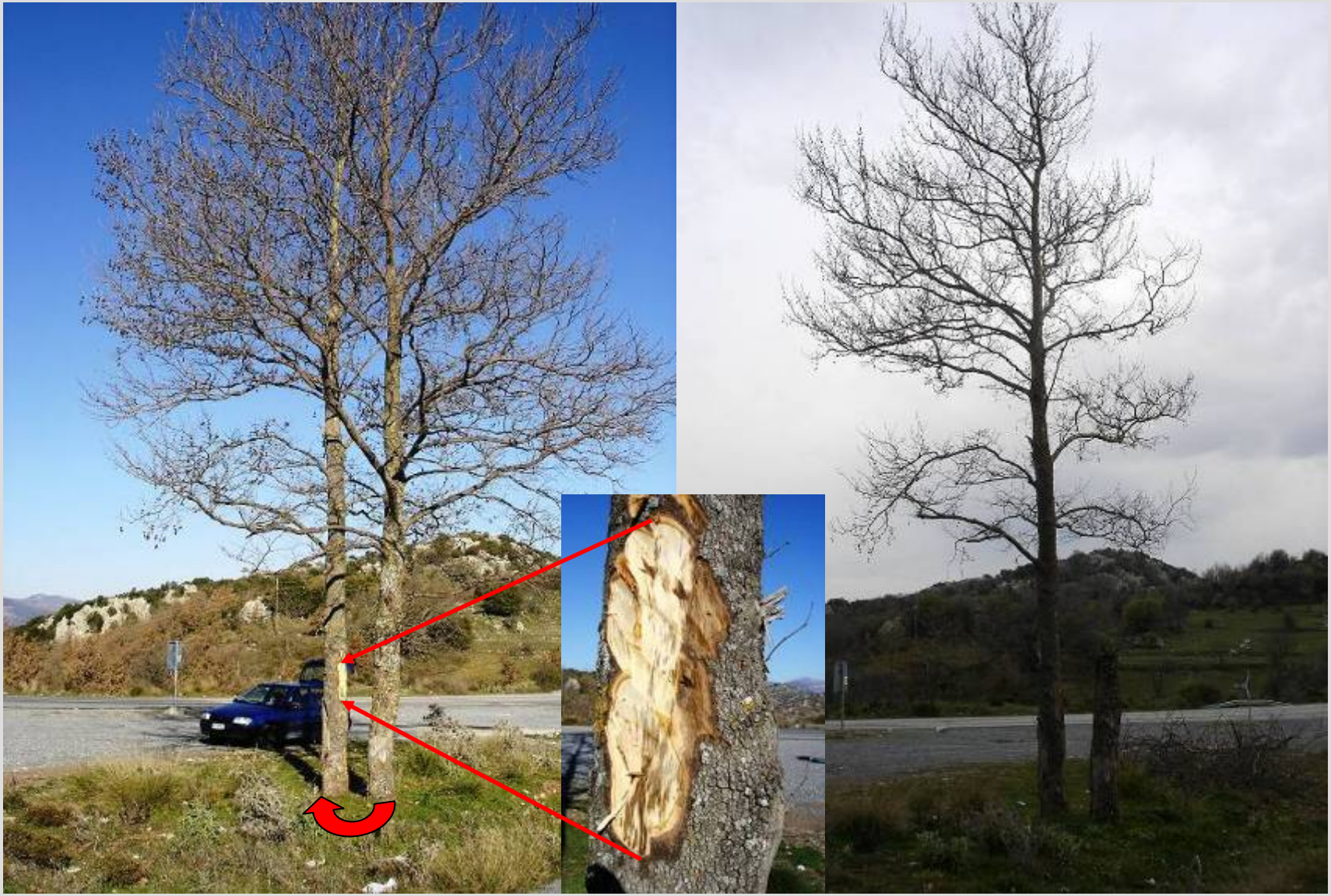

19 7 2007

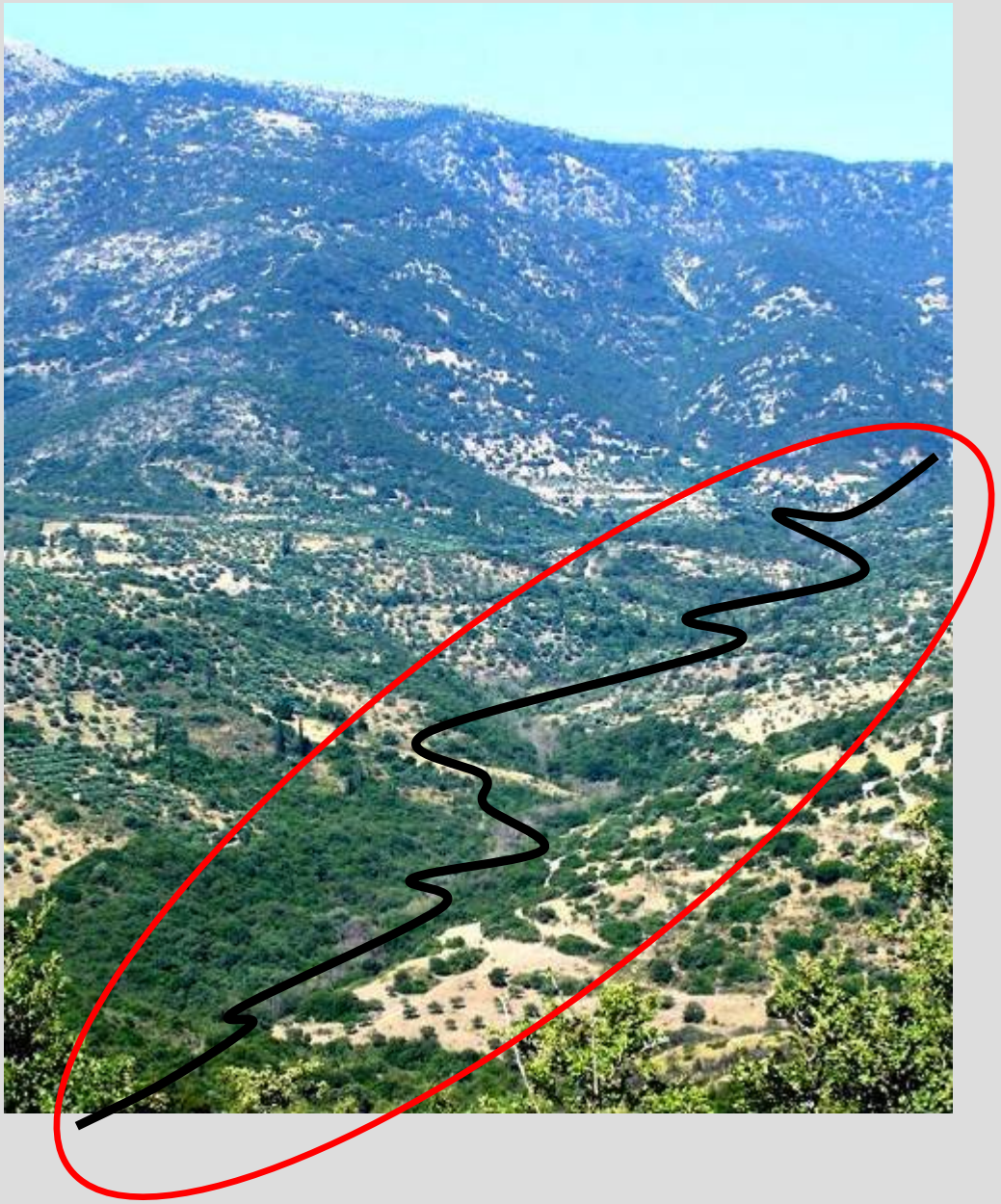

9 9 2007

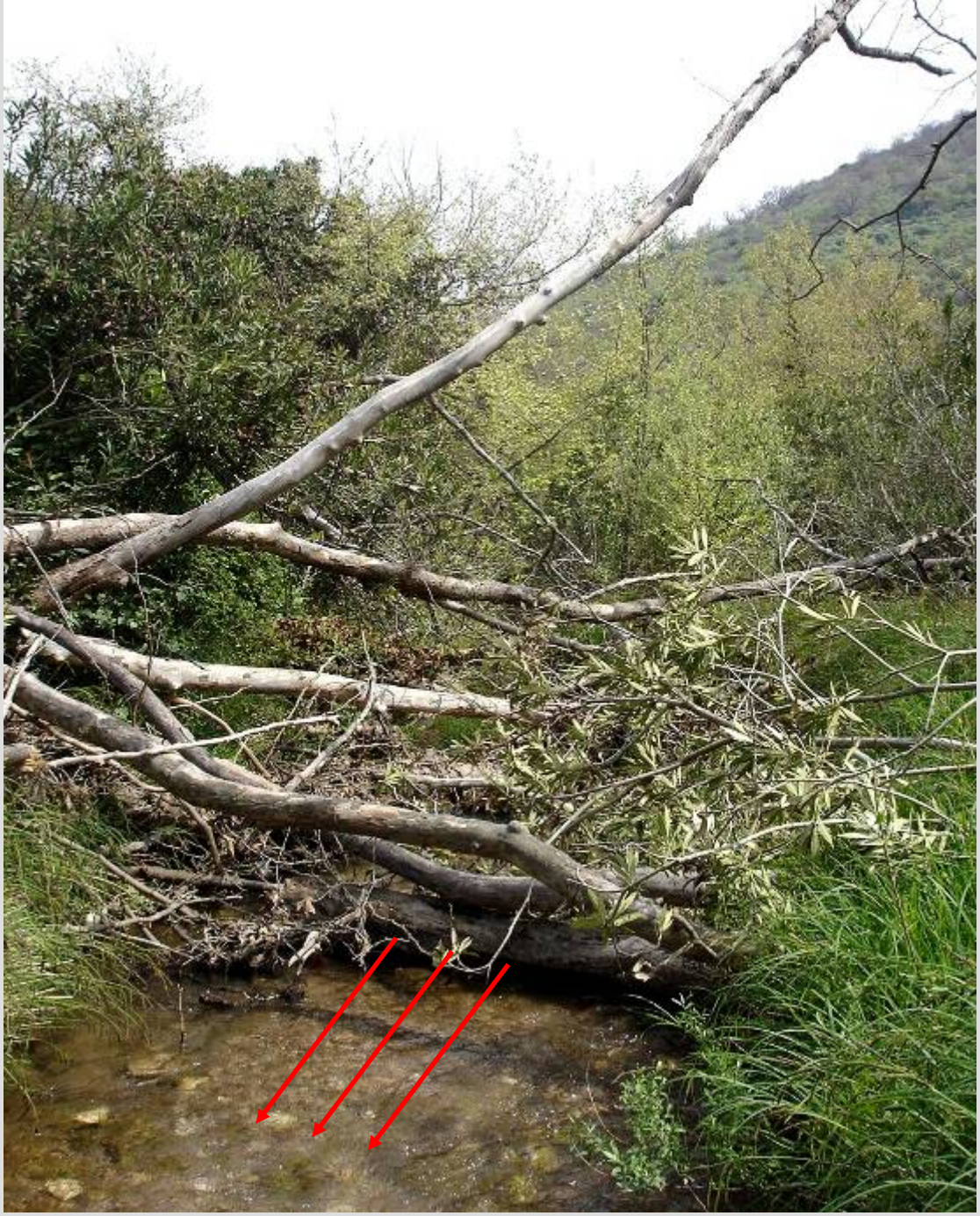

Skopje
Tiranë
Macedonia (FYROM)
Albania
Istanbul
Bursa
Eskisehir
Kerkyra
Greece
Lefkada
Chios
Izmir
Athinai
Zakynthos (Zante)
Samos
Antalya
Kos
Kriti (Crete)
360 km
Image © 2007 TerraMetrics
© 2007 Europa Technologies
© 2007 Lista Aziende fornito da PagineGialle.it
Image NASA
©2007 Google


Ithaki
Kefallonia
Makri
Oxeia
Pátrai
Zakynthos (Zante)
Strofades
Salamina
Athinai
Kalithea
Fleves
Kyra
Aigina
Patroklou
Romvi
Psili
Poros
Gios Georgios
Dokos Ydra
Spetses
Proti
Sfaktiria
Sapientza
Schiza
Velopoula
Falconera
Elafonisos
90 km
Image © 2007 TerraMetrics
© 2007 Europa Technologies
Image © 2007 DigitalGlobe
Image NASA
©2007 Google

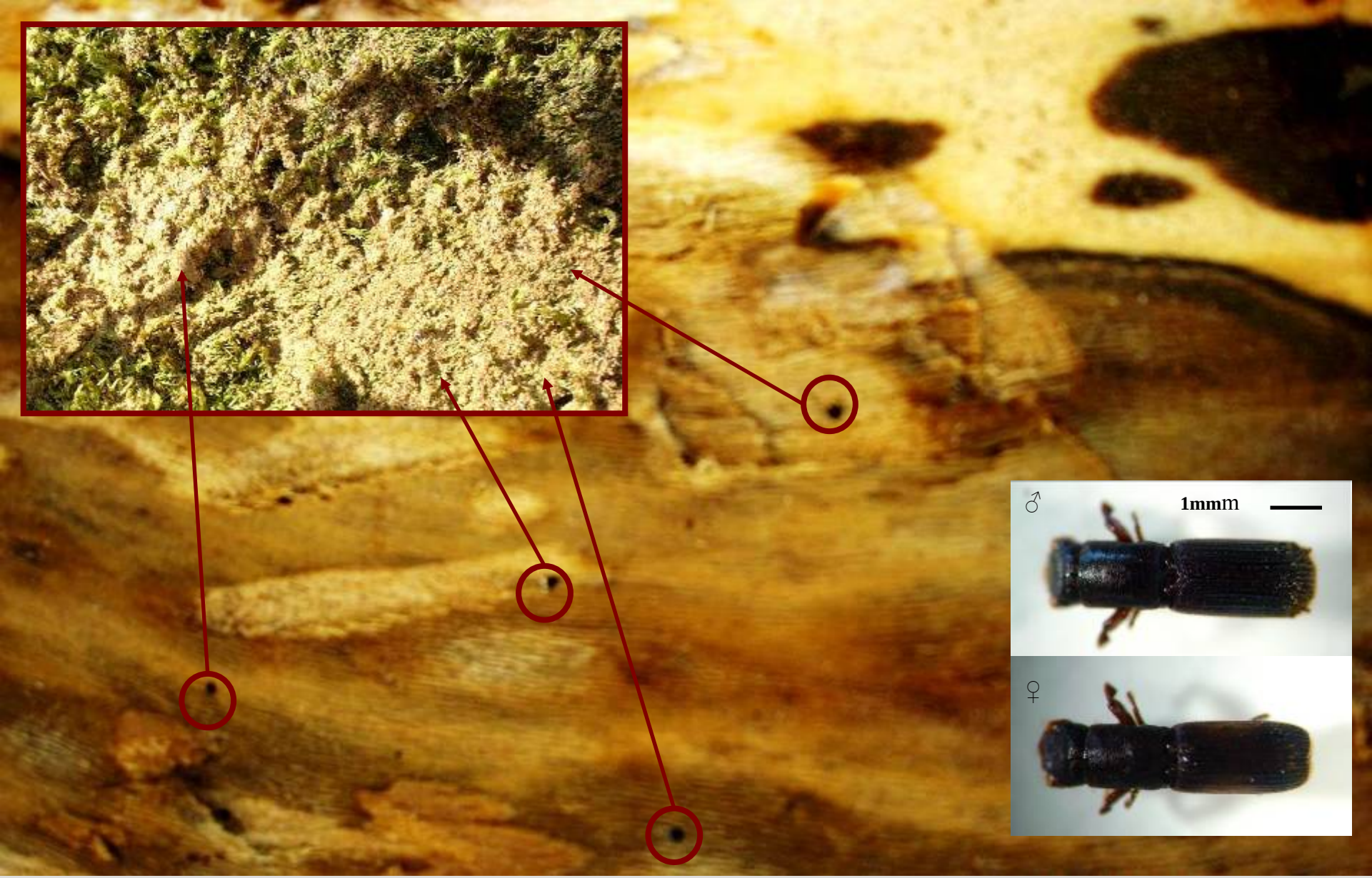

Arkadia
N
Messinia
Proti
22.1 km
Image © 2008 DigitalGlobe
Image © 2008 TerraMetrics
© 2008 Tele Atlas
© 2008 Europa Technologies
Google
Pointer 37°12'44.08" N 21°56'47.39" E elev 111 m
Streaming 100%
Eye alt 76.19 km








11 8 2007



Ambrosia beetle (*Platypus cylindrus*) adults, frass and tunnels in cross section.


12 7 2007

Litargus connexus

Xyleborinus saxeseni

7 2007

7 2007


14 7 2007


14 7 2007


14 7 2007


6 8 2007


ROUNDUP
14 7 2007


30 8 2007


ΕΥΡΩΠΗ
2 ΕΥΡΩ
2002


ΕΛΛΑΣ
Λ. 20