

Computers And Society

Instructor: Dmitri A. Gusev

Fall 2007

CS 113: Introduction to Computers

Lecture 16, December 13, 2007

Ethical Issues in Computing

1. Disparity in access to computers and networks
2. Cryptography and encryption
3. Illegal copying of copyrighted content and software
4. Privacy and networking
5. Bioinformatics and personal genetic information
6. HIPAA (Health Insurance Portability and Accountability Act) and the electronic distribution of medical information
7. Software patents
8. Availability of satellite information
9. Open source software development
10. Computer hoaxes and scams
11. Identity theft and impersonation
12. Microsoft antitrust case
13. Spam
14. Certification and licensing of computing professionals
15. Viruses, trojan horses, worms
16. Deep linking and image inlining
17. Cybersquatting
18. Netiquette

UNESCO Definition of Culture

- “Universal Declaration on Cultural Diversity”, UNESCO (the United Nations Educational, Scientific and Cultural Organization), 2002: *“... culture should be regarded as the set of distinctive spiritual, material, intellectual and emotional features of society or a social group, and that it encompasses, in addition to art and literature, lifestyles, ways of living together, value systems, traditions and beliefs.”*

Material Culture

- Work of Artisans and Builders; Industry and Technology
- Agriculture: Cultivation of Land
- Cuisine (a specific set of cooking traditions and practices, often associated with a specific culture)

Spiritual Culture

- Language
- Religion and Morality/Ethics
- Popular culture:
 - Cinematography
 - Radio and Television
 - Folk and popular music
 - Folk and modern dance
 - Sports and games
- “High culture”:
 - Art (painting, sculpture)
 - Literature
 - Classical music and dance, theater

Social and Intellectual Culture

- Science, education, and Information Technology
- History
- Law and law enforcement
- Architecture
- Medicine and physical culture/fitness
- Ecology (norms and patterns of interacting with the environment/Nature)
- Human reproductive and sexual behavior, adoption
- Business and Corporate Culture
- Military culture
- Political culture

Information Technology (IT)

- **Information technology (IT)** is the study, design, development, implementation, support or management of *computer-based information systems*, particularly software applications and computer hardware. A few of the duties that IT professionals perform may include:
 - Data management
 - Computer networking
 - Computer engineering
 - Database systems design
 - Software design
 - Management information systems
 - Systems management or System administration
 - Voice over IP (VoIP)

Computer-Aided Design/Drafting (CAD)

- **Computer-aided design (CAD)** is the use of a wide range of computer-based tools that assist engineers, architects and other design professionals in their design activities. CAD originally meant Computer Aided Drafting because of its original use as a replacement for traditional drafting. Modern functions of CAD systems include
 - 2D technical drawing of physical components
 - Engineering of 3D models
 - Conceptual design and layout of products
 - Strength and dynamic analysis of assemblies

Fields of CAD Use

- Architecture, civil engineering, construction
- Mechanical engineering: MCAD
- Electronic design automation (EDA): ECAD
- Electrical engineering
- Manufacturing process planning
- Industrial design (furniture, automotive, etc.)
- Fashion design: Apparel and Textile CAD
- Garden design, etc.

Computer-Aided Manufacturing (CAM)

- The abbreviation **CNC** stands for **computer numerical control**, and refers specifically to a computer "controller" that reads G-code instructions and drives the machine tool, a powered mechanical device typically used to fabricate metal components by the selective removal of metal. The operating parameters of the CNC can be altered via software load program. CNC was preceded by NC (Numerically Controlled) machines, which were hard wired and their operating parameters could not be changed.
- **Computer-aided manufacturing (CAM)** is the use of a wide range of computer-based software tools that assist engineers and CNC machinists in the manufacture or prototyping of product components. Traditionally, CAM has been considered as an NC programming tool wherein 3D models of components generated in CAD software are used to generate CNC code to drive numerical controlled machine tools. CNC machines today are controlled directly from files created by CAM software packages, so that a part or assembly can go directly from design to manufacturing without the need of producing a drafted paper drawing of the manufactured component.

Computer-Integrated Manufacturing (CIM)

- Computer-integrated manufacturing (CIM) is a method of manufacturing in which the entire production process is controlled by computer. Typically, it relies on closed-loop control processes, based on real-time input from sensors.

Product Lifecycle Management (PLM)

- Product lifecycle management (PLM) is the title commonly applied to a set of application software that enables the New Product Development (NPD) business process. Within PLM there are four primary areas:
 - Product and Portfolio Management (PPM)
 - Product Design
 - Manufacturing Planning (MPM)
 - Product Data Management (PDM)

Embedded Computers/Microprocessors

- An **embedded** system is a special-purpose computer system designed to perform one or a few dedicated functions. Embedded systems require relatively little human-computer interaction. In contrast, a general-purpose computer can do many different tasks depending on programming.
- Embedded microprocessors are found in household appliances, automobiles, cellular phones and other electronic devices. Embedded systems range from portable devices such as digital watches and MP3 players, to large stationary installations like traffic lights, factory controllers, or the systems controlling nuclear power plants.

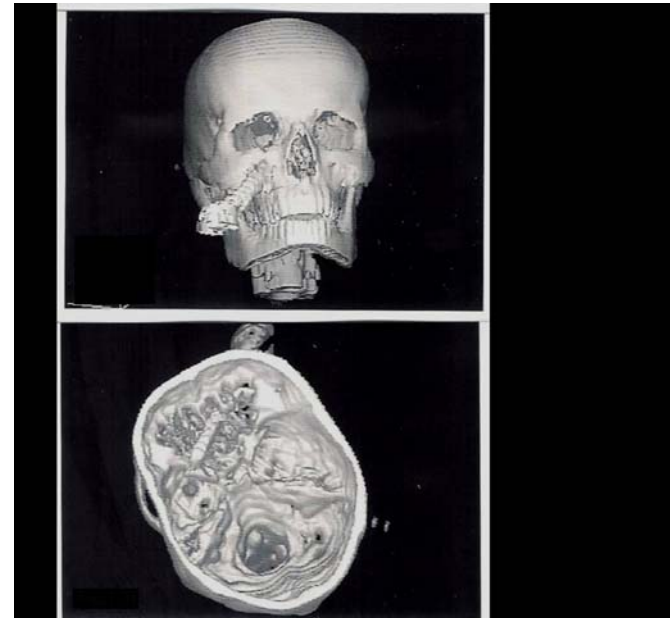
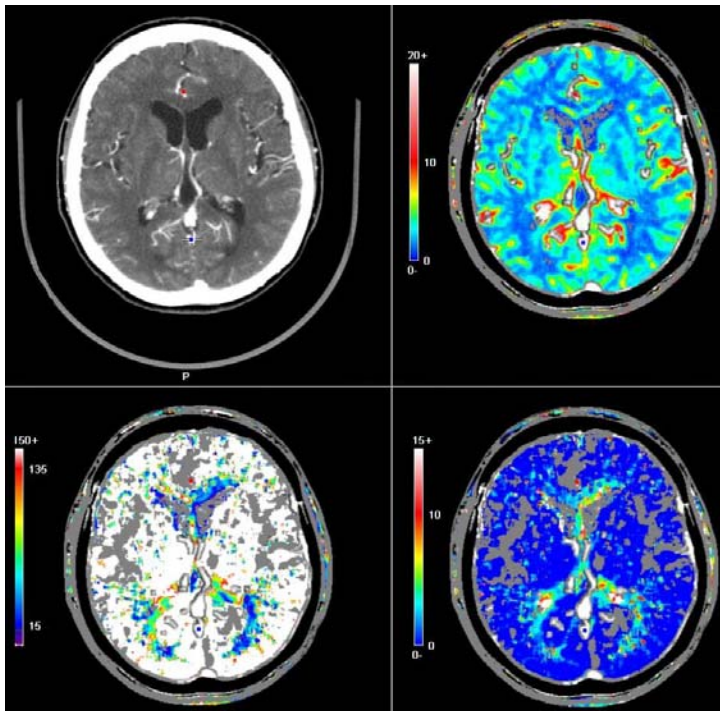
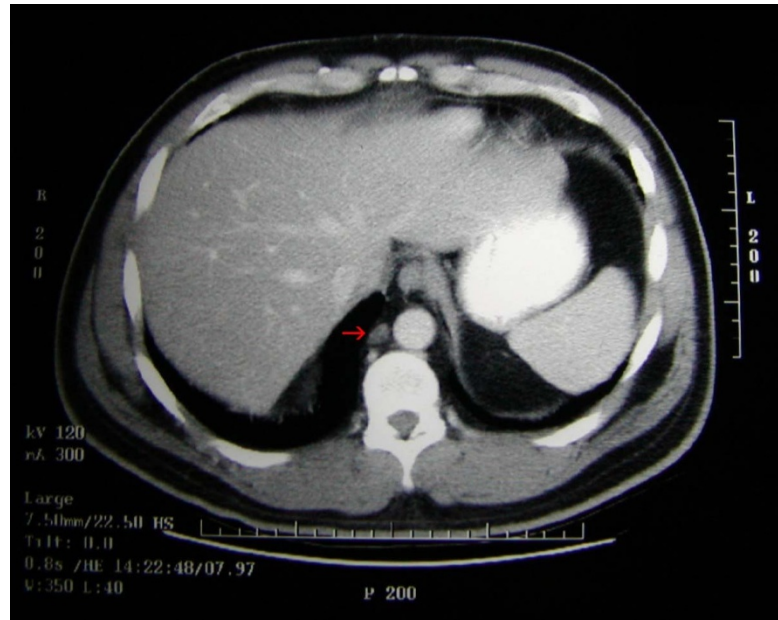
Ultrasonography

- Medical ultrasonography is an ultrasound-based diagnostic imaging technique used to visualize muscles and internal organs.
- “Ultrasound“: Acoustic signal with a frequency above the limit of human hearing (20 kilohertz). Typical diagnostic sonographic scanners operate in the frequency range of 2 to 18 megahertz
- Digital sonographic images are used as input to systems for computer-aided diagnostics and computer-assisted surgery



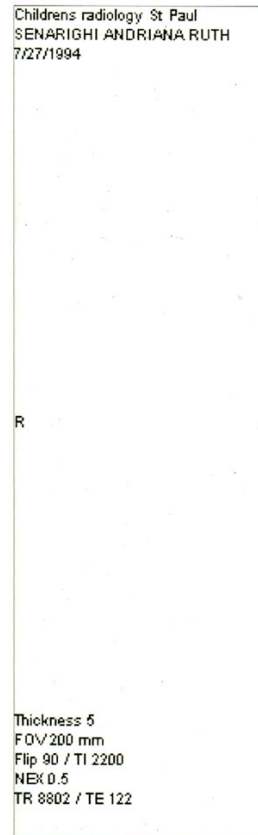
Computed Tomography

- CT: Digital geometry processing is used to generate a three-dimensional image of the internals of an object from a large series of two-dimensional X-ray images



Magnetic Resonance Imaging (MRI)

- A computed tomography (CT) scanner uses X-rays, a type of ionizing radiation, to acquire its images, making it a good tool for examining bone and calcifications within the body, or structures (vessels, bowels). MRI, on the other hand, uses non-ionizing radio frequency (RF) signals to acquire its images and is best suited for non-calcified tissue. Aided by a computer, MRI is able to produce images from many different body angles and plans, which enables radiologists to quickly and precisely diagnose a wide variety of conditions.



Medical Expert Systems

- An expert system is a computer program that contains some of the subject-specific knowledge, along with the formalized knowledge and analytical skills of one or more human experts.

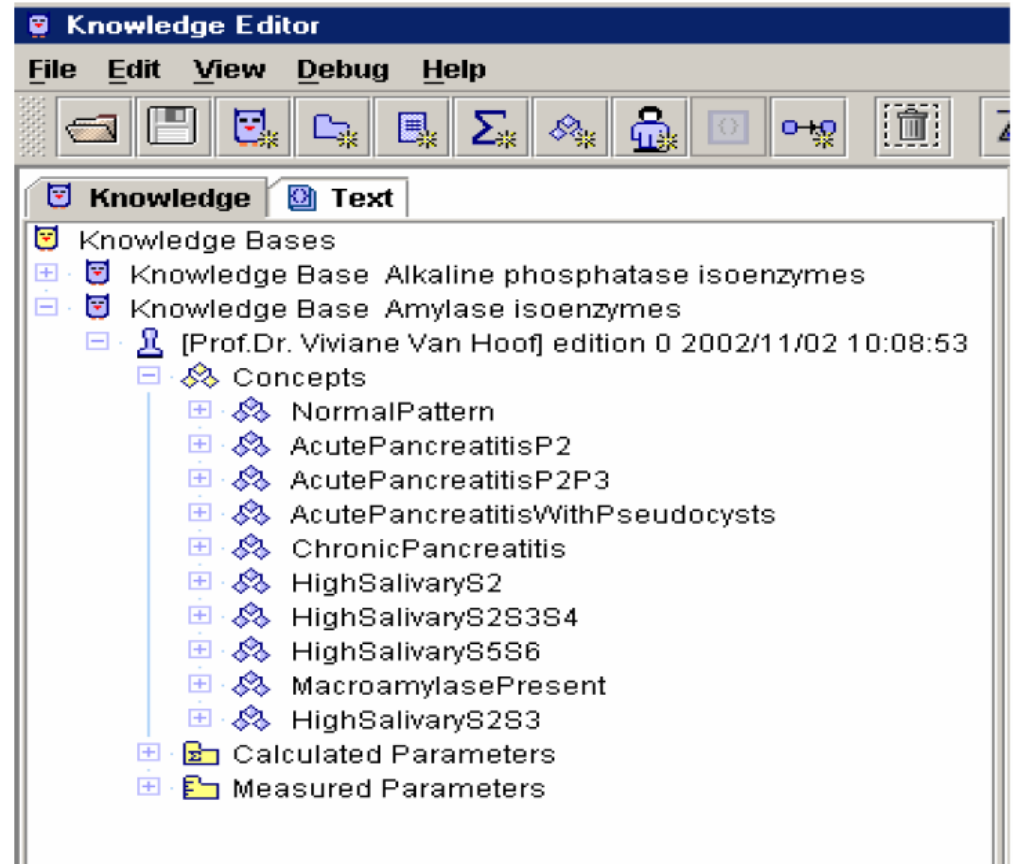
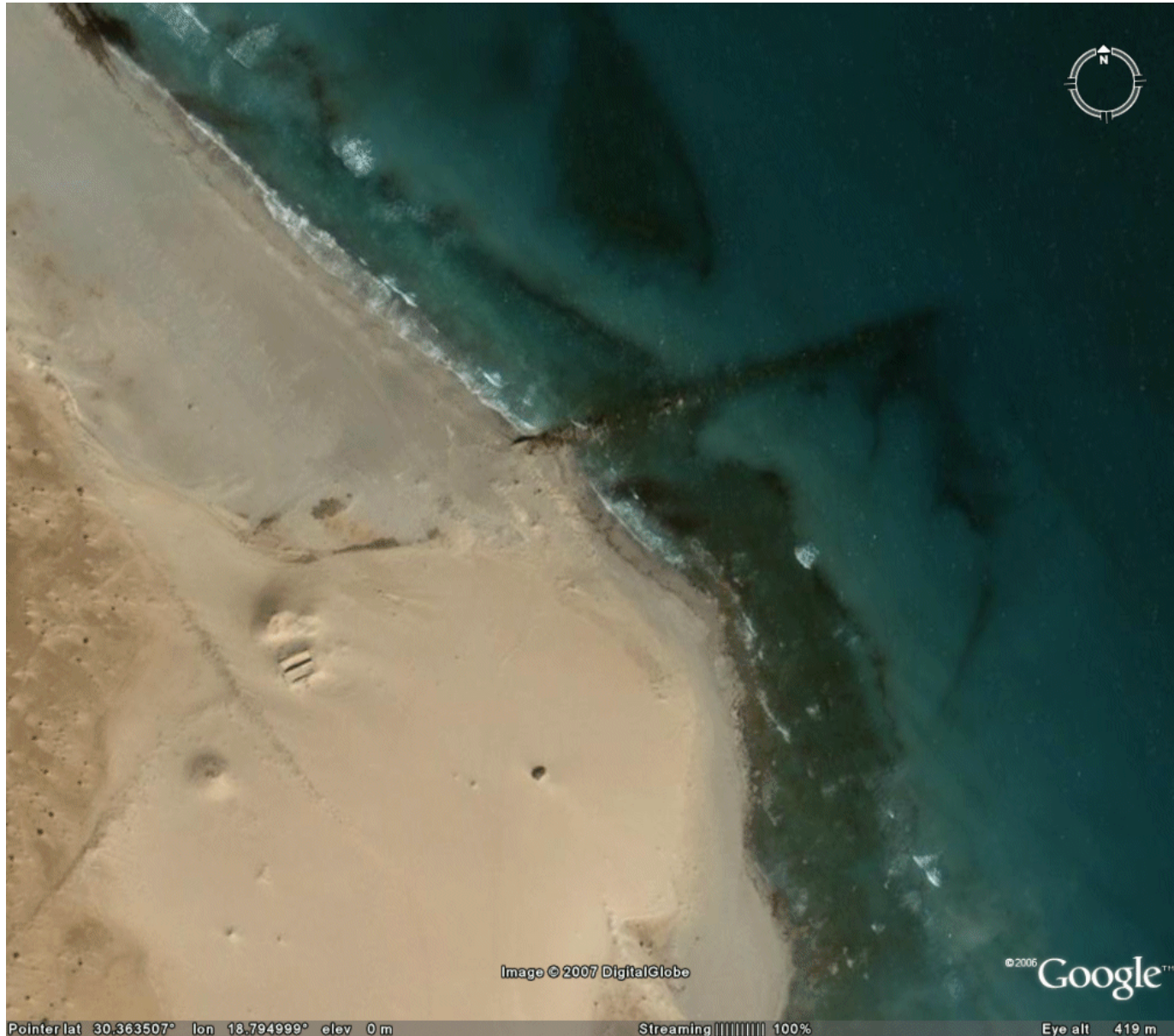


Figure 1 - Concepts that were defined in the j.MD isoamylase knowledge base

Remote Sensing



Computer Analysis of Genetic Data

Tracing Human History Through Genetic Mutations

By examining DNA patterns that are inherited maternally or paternally, scientists can trace human lineages back to the original branches, or sons and daughters, of a genetic Adam and an Eve.

Europe

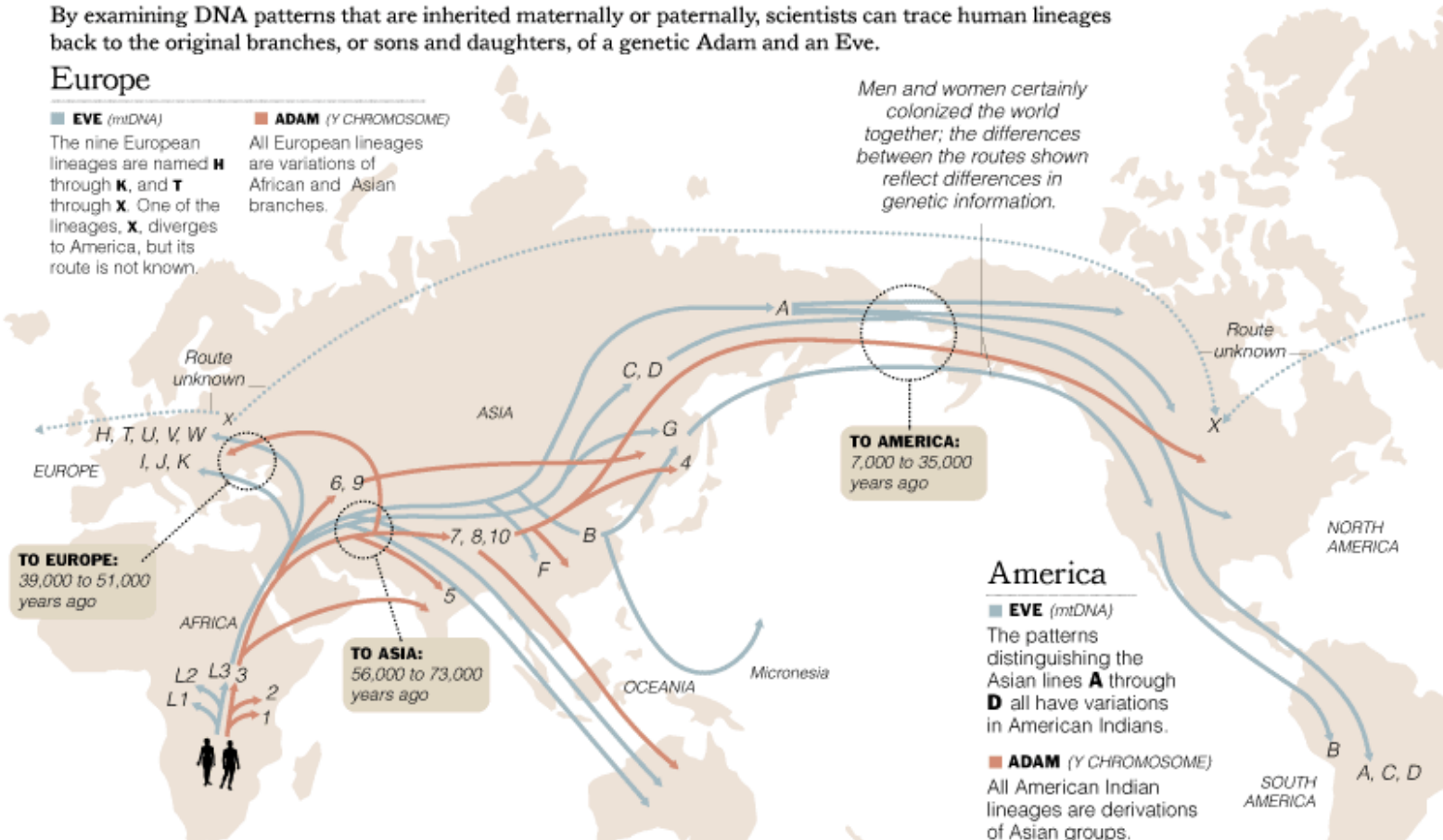
EVE (mtDNA)

The nine European lineages are named **H** through **K**, and **T** through **X**. One of the lineages, **X**, diverges to America, but its route is not known.

ADAM (Y CHROMOSOME)

All European lineages are variations of African and Asian branches.

Men and women certainly colonized the world together; the differences between the routes shown reflect differences in genetic information.



Africa

EVE (mtDNA)

The three African branches are named **L1** through **L3**, and **L3** separates into all the other branches.

ADAM (Y CHROMOSOME)

The three African branches are named **1**, **2** and **3**, and **3** separates into all the other branches.

Asia

EVE (mtDNA)

The six Asian branches are named **A** through **D** and **F** and **G**.

ADAM (Y CHROMOSOME)

The seven Asian branches are **4** through **10**, and these groups branch off into Oceania, Europe and America.

America

EVE (mtDNA)

The patterns distinguishing the Asian lines **A** through **D** all have variations in American Indians.

ADAM (Y CHROMOSOME)

All American Indian lineages are derivations of Asian groups.

Sources: Dr. Douglas C. Wallace, Marie T. Lott, Emory University; Dr. Peter A. Underhill, Stanford University; "Genes, Peoples, and Languages," by Dr. Luca Cavalli-Sforza

Trees of Languages

- Mark Pagel, Quentin D. Atkinson, Andrew Meade, *Frequency of word-use predicts rates of lexical evolution throughout Indo-European history*, Nature, Vol. 449 (2007) pp. 717–720.
- L.L. Cavalli-Sforza, Eric Minch, and J.L. Mountain, *Coevolution of Genes and Languages Revisited*, Proc. Natl. Acad. Sci. USA, Vol. 89 (1992) pp. 5620-5624

