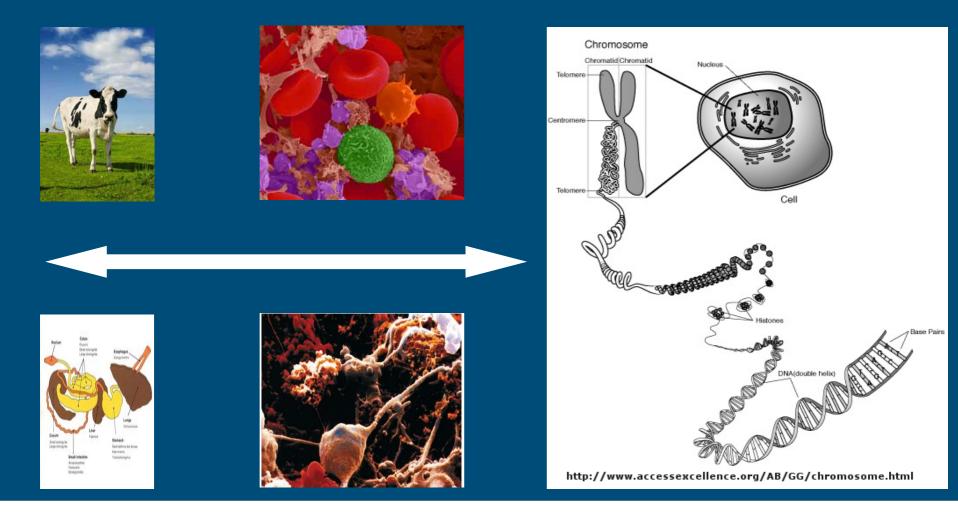
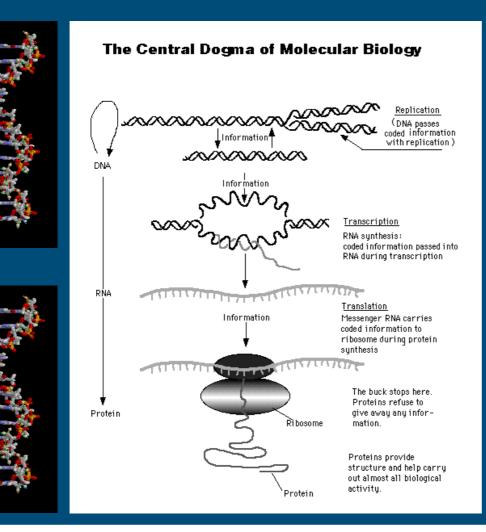
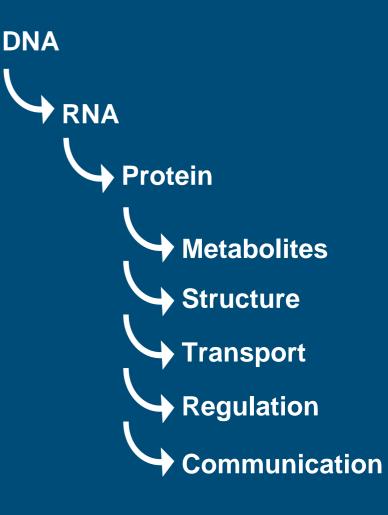
From living systems to DNA





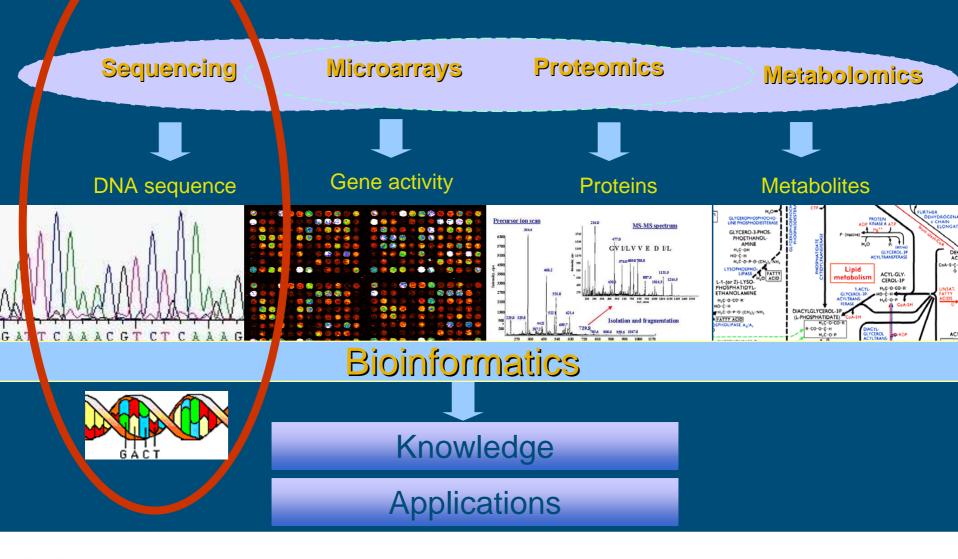
DNA is the carrier of all genetic information







Genomics; analysis of all genes instead of one





Analysis of DNA sequence

Large sequencing centers

- Genome sequence of human (3,253,037,807), chicken, cow, (pig), dog, cat, mouse, rat chimpanzee, frog, etc.
- We know the genes/proteins and their structures

Ultra high troughput sequencers 20.000.000 – 100.000.000 / run



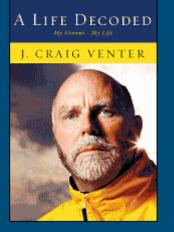


DNA sequencing revolution genome sequence of individuals come of age



James Watson, June 2007

2 months vs 13 years 1 million vs 3 billion \$



Levy S, et al., The Diploid Genome Sequence of an Individual Human. PLoS Biol. 2007 Sep 4;5(10):e254



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Analysis of genetic variation (SNP)

1 SNP per 1000 bp

---AAGCTTTGCGGTACTT---

Identification

- By sequence analysis
- We know the genetic variation

Challenge: which SNPs linked to trait X, Y, Z



Genome sequence Bos taurus

Statistics

Assembly:	Btau_3.1, Aug 2006			
Genebuild:	Ensembl, Sep 2006			
Database version:		44.3a		
Known genes:		16,945		
Projected genes:		1,610		
Novel genes:		3,725		
Pseudogenes:		1,264		
RNA genes:		1,671		
Genscan gene predictions: 59,639				
Gene exons:		220,542		
Gene transcripts:		29,598		
SNPs:		1,792,456		
Base Pairs*:		3,247,285,296		
Golden Path Length**:		3,033,353,239		

Btau_3.1 is an assembly of the

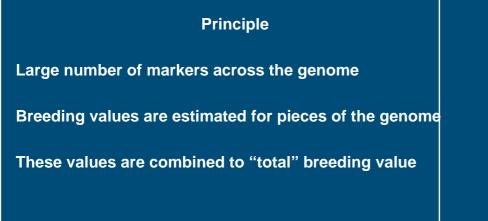
cow, Bos taurus, Hereford breed.

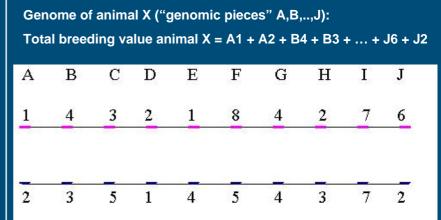


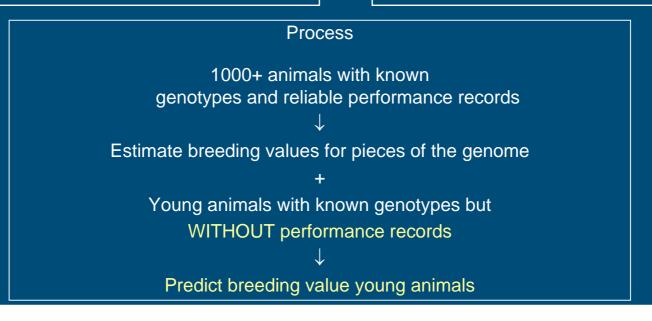
http://www.ensembl.org/Bos_taurus/index.html



Genomic Selection

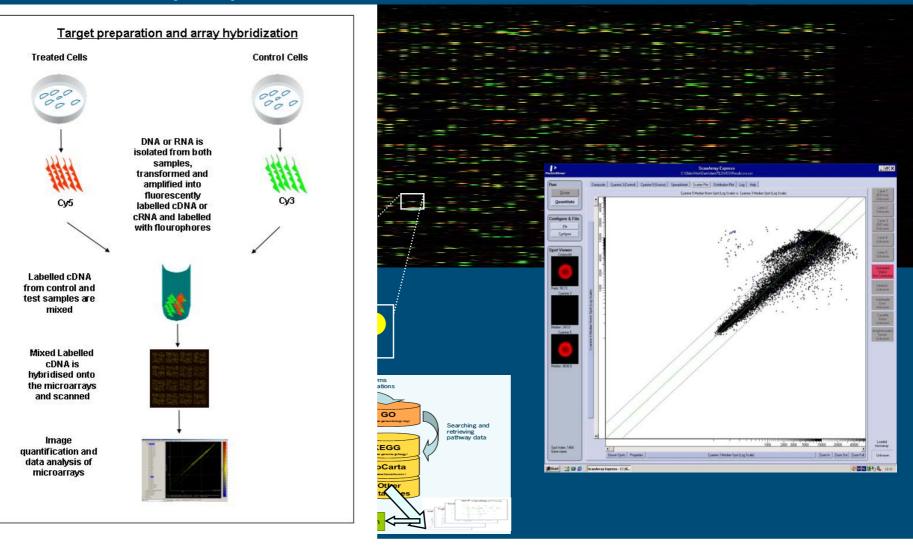








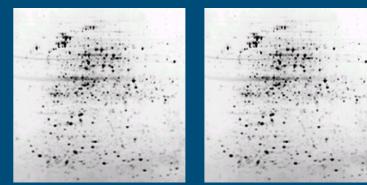
Microarray hybridisation

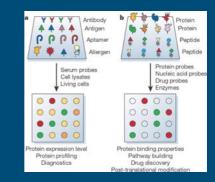


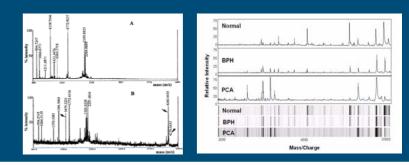


Proteomics (phosphoproteomics, glycoproteomics)

- Separation, purification
- Profiling
- Identification
- Interaction
- 1-D gelelectroforese
- 2-D gelelectroforese
- Immune affinity chromatography
- Protein microarrays
- HPLC-MS, HPLC-MS/MS
- Yeast two hybrid
- FRET, SPR
- MALDI-TOF, SELDI-TOF

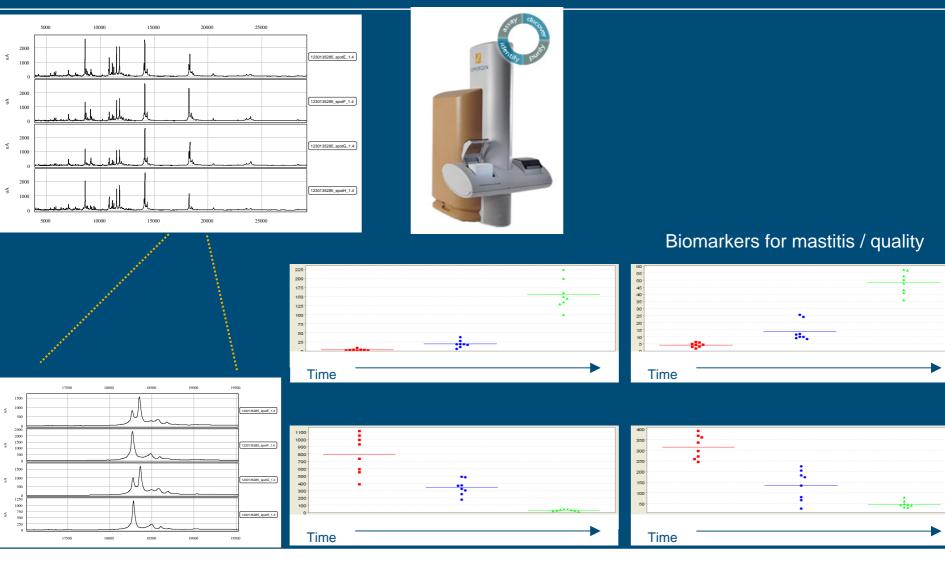








Milk composition: proteins





homozygous

Potential applications of functional genomics information

Measure or monitor health or quality parameters (biomarkers)

- Udder, intestine, immune responsiveness, product quality
 - Deviations from this early warning
- Measuring effects of treatments
 - Correlates of protection after vaccination

Modulation of pathways / biological processes

- By vaccine adjuvants that work by activating innate immunity and direct the development of the adaptive immunity
- By feed ingredients that improve "awareness" of innate immune system
- By other compounds: minerals, receptor-ligands, RNAi, etc

Development of new tools and methodologies

- Vaccines or prevention measures
- Feed or management regimes

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