

Birth and the First Postnatal Hour

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University of Notre Dame
Human Nature and Early Experience: Addressing the
“Environment of Evolutionary Adaptedness”



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The birth experience has an effect on

- maternal satisfaction and self confidence
- immediate neonatal adaptation
- maternal and neonatal stress levels
- maternal-infant bonding
- breastfeeding success and duration
- neonatal neuroendocrine function
- neonatal state of arousal
- epigenetic processes

What was birth like in the EEA?

- ethological study based on observations of more than 250 births in homelike (non-hospital) settings
- graphic photographs follow....

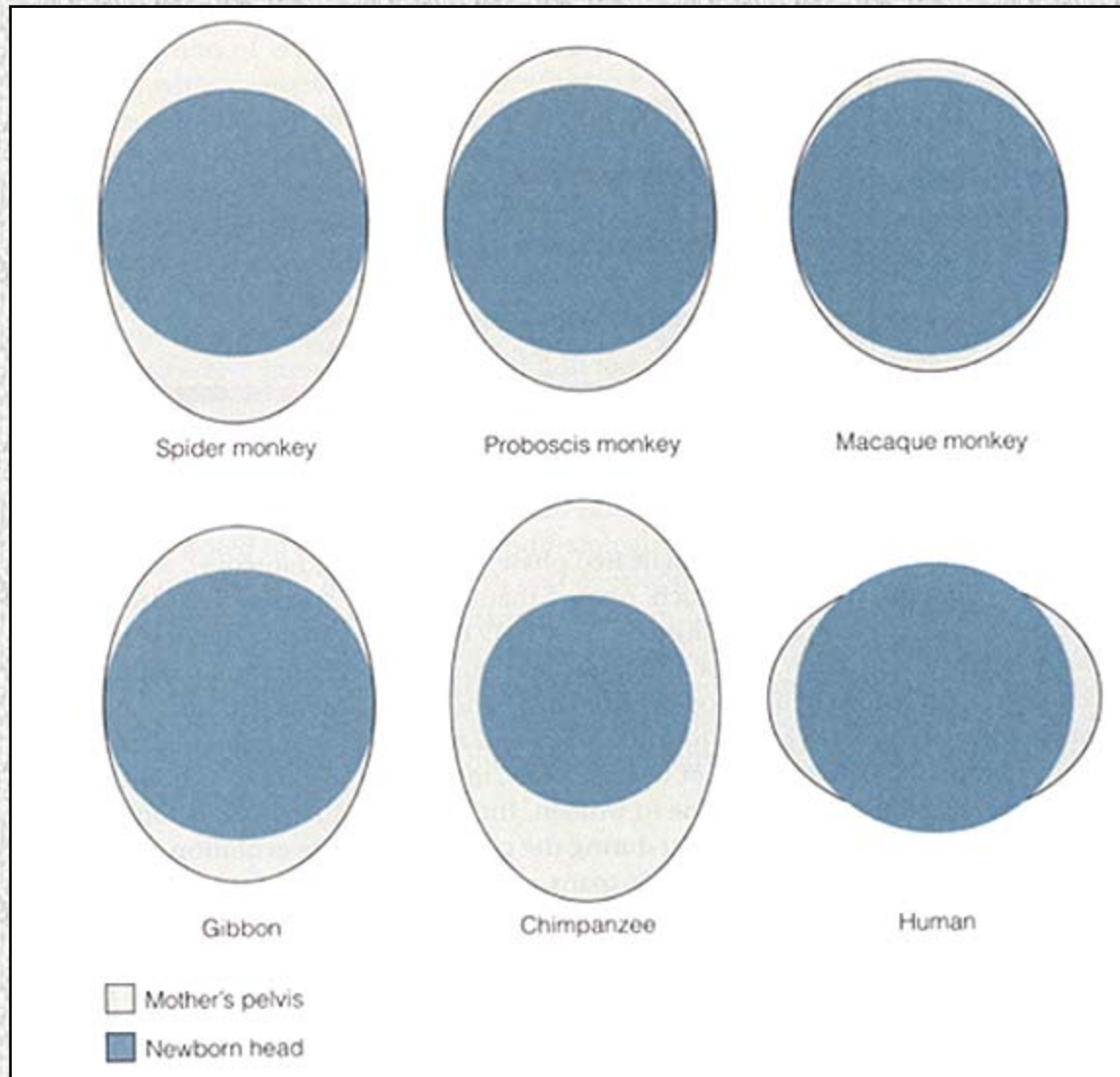
Aspects of birth in the EEA that are worth preserving

- supportive companions are present (doula-assisted birth)
- delivery is in the squatting, or upright, position
- cord is cut when it stops pulsating
- mother and infant are not separated during the early postpartum period
- breastfeeding is initiated soon after birth

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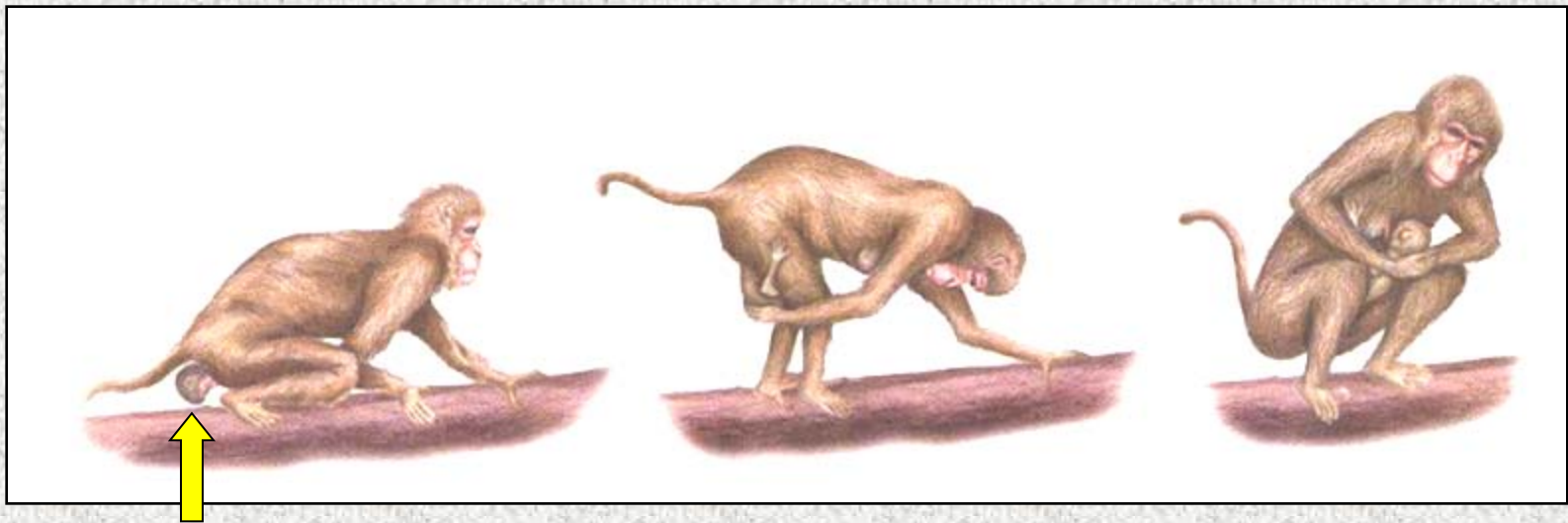
Birth is challenging for most primates



More so for humans because of bipedalism

- mother's pelvis is narrow and baby's head is large – tighter squeeze than for most primates
- reorientation of pelvis requires that the baby undergo a series of rotations to travel through the birth canal
- baby emerges facing the mother's back rather than the front as in most primates

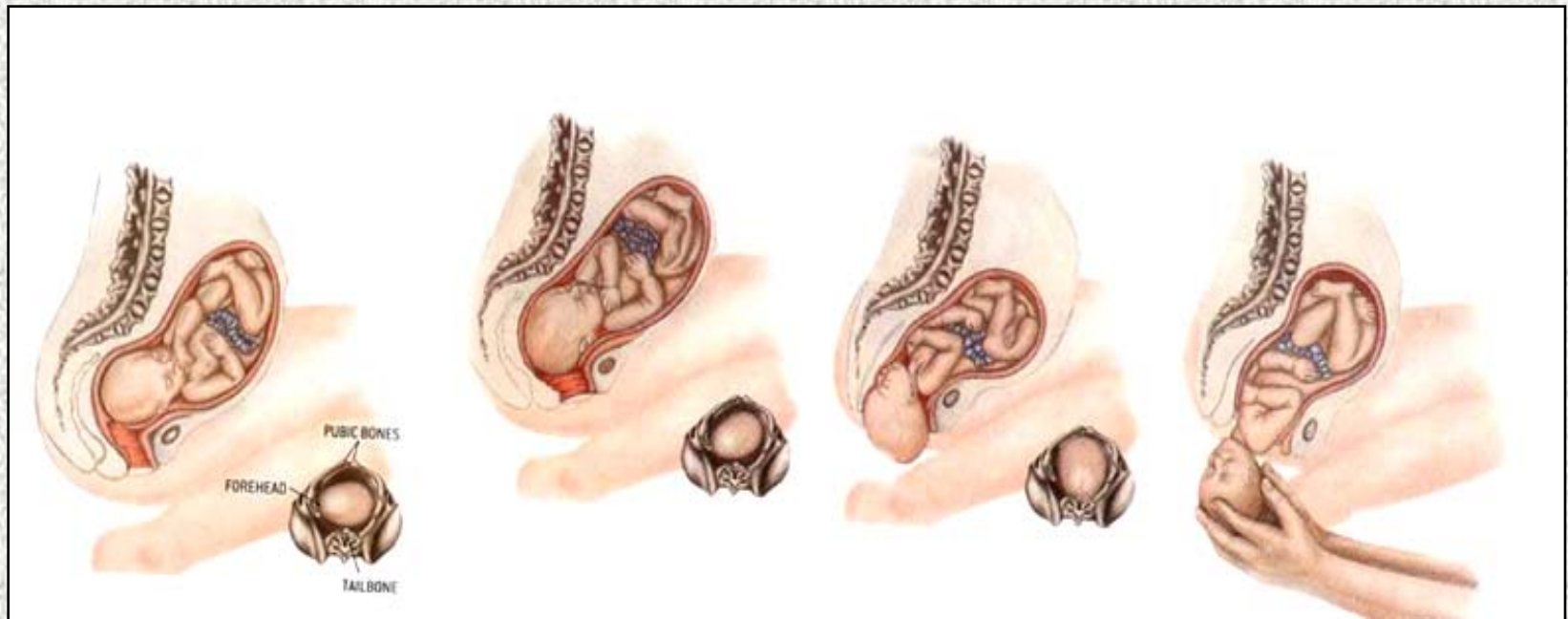
Most mammals give birth alone



Japanese macaque delivery

From Scientific American 285 (5):72-77, 2007

others are commonly present
at human births – birth is a social event

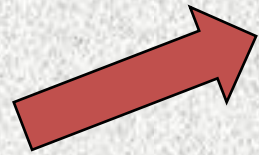


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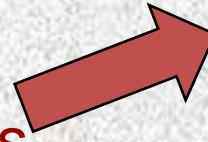
Compromise in evolution of birth

- efficient bipedalism = small pelvis = tight squeeze for big brain = compromise
- 75% of brain growth delayed to postnatal period – human infants more helpless at birth: challenges to parenting

**anatomical
changes
for bipedalism
and expanded
brain size**



narrow pelvis
large head



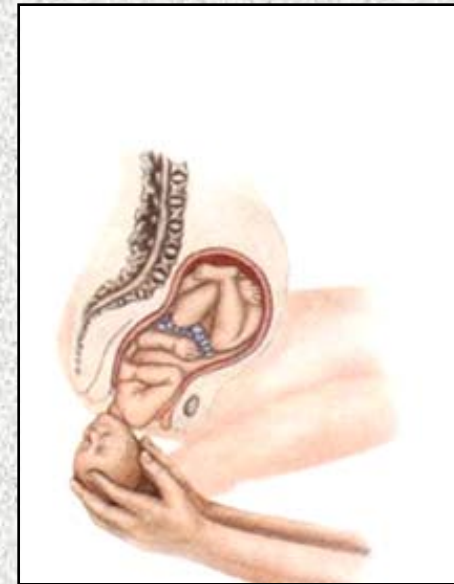
infant less
developed
at birth



infant born facing
away from mother



mother seeks assistance



What is the evolutionary legacy of birthing women?

A strongly felt need for emotional support at the time of birth.

Evolutionary Medicine: distinction between defects and defenses

biomedicine: pain and anxiety in childbirth are problems that interfere with the birth process.

evolutionary medicine: up to a point, pain and anxiety in childbirth may have been advantageous in the past if they led women to seek companionship at birth.

Anxiety in labor can lead to:

- increase in levels of stress hormones
- decrease in uterine contractibility
- longer labor
- greater likelihood of cesarean section
- challenges to interaction with the infant
- challenges to initiating breastfeeding

Advantages of having emotional support during labor and delivery (doula support)

- decreased length of labor
- decreased c-section rate
- decreased use of oxytocin
- decreased use of epidurals
- increased responsiveness to infant

Medical problem

anxiety and pain during labor and delivery

Medical solution

drugs to suppress pain and calm anxiety

Evolutionary perspective

pain and anxiety led women to seek assistance in the ancestral past, which reduced morbidity and mortality

Evolutionary medicine

provide emotional support during labor and delivery

Mismatch of our 21st century lives and millions of years of evolutionary history

high tech industrialized birth may be mismatched with evolved needs

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Advantages of the upright position

- contractions work with gravity
- expands the birth canal
- occiput bears most of force of the contractions (frontal bones bear them in lithotomy position)
- less reported pain and use of analgesics
- fewer perineal tears and episiotomies
- shorter second stages
- higher infant Apgar scores

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Advantages of delayed cutting of the umbilical cord

- backup system for oxygen
- increases infant blood volume by up to 30% (especially important if mom's hemoglobin was low in pregnancy)
- increase iron stores – associated with reduced incidence in anemia even in US

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“There is a sensitive period in the first minutes and hours of life during which it is *necessary* that the mother and father have close contact with their neonate for later development to be optimal.”

Klaus and Kennell, 1976; (emphasis added).

maternal behaviors in the first postnatal hour

- touching, rubbing, massaging the infant
- holding the infant to the left of the body
- elevating the pitch of the voice when talking to the infant
- initiating nursing within an hour of birth
- looking at the infant *en face*

evolutionary perspective on touch of the infant at birth

- stimulates breathing
- provides warmth
- rubs in the vernix, which may prevent dehydration and infection

evolutionary perspective on left lateral holding of the infant

- heartbeat soothes the infant
- facilitates eye contact
(infants prefer to look to the right)

elevated voice pitch and eye contact
also soothe infant

...the events of pregnancy and the early postpartum period may -- given the appropriate background and proximal conditions -- facilitate the process of attachment to offspring and make the transition from nonmother to mother somewhat easier.

Allison Fleming, 1990

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- mother and infant are not separated during the early postpartum period
- **breastfeeding is initiated soon after birth**

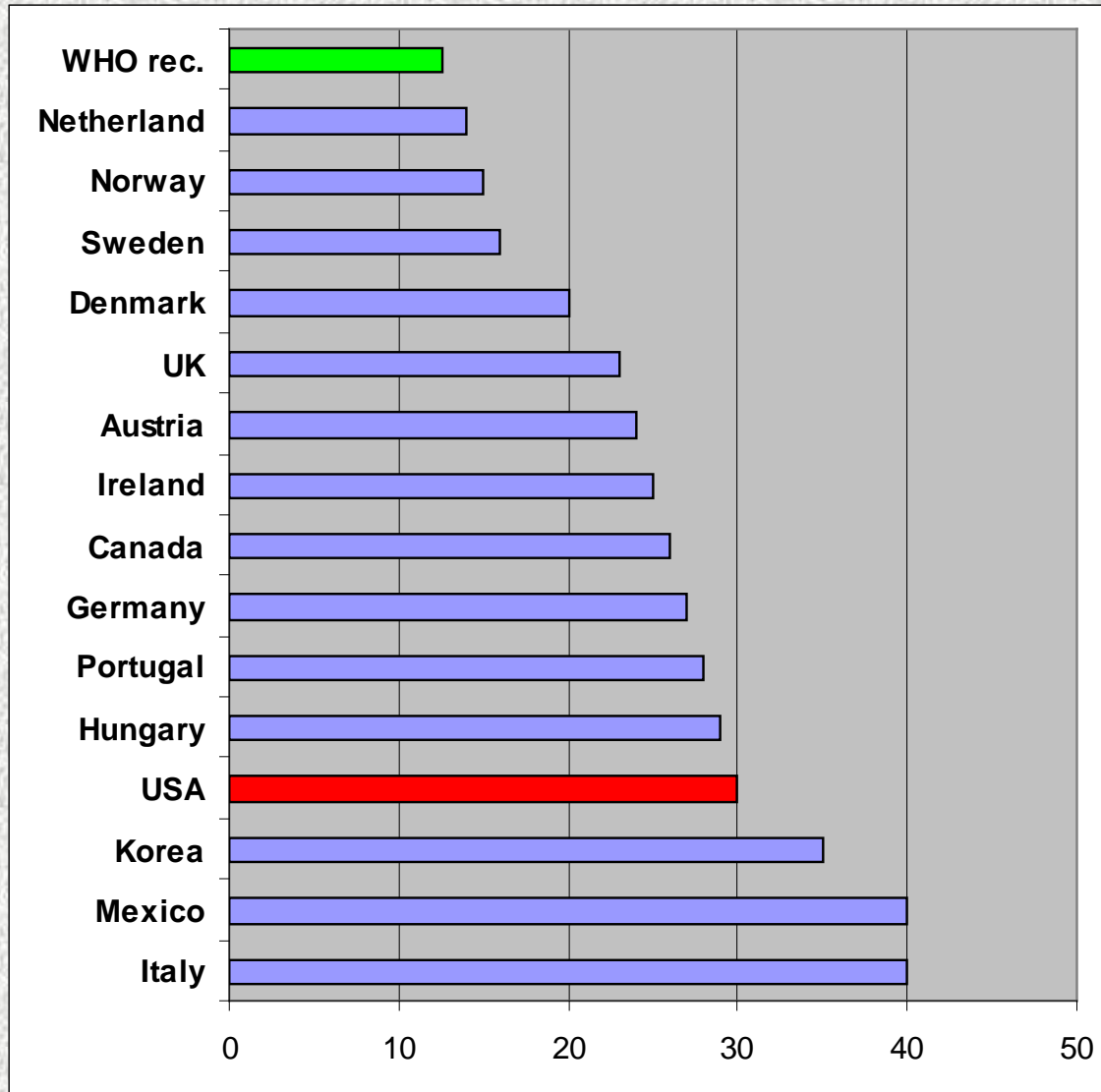
Advantages of early breastfeeding

- sooner the better
 - oxytocin released – placenta delivery and inhibit postpartum hemorrhage
 - easier to establish successful breastfeeding
- longer duration
- lower under-five mortality in Africa and Asia

Questionable contemporary birth practices

elective cesarean section delivery

Cesarean section rates in selected countries



Many lives saved, but c-section is not risk free: evolutionary medicine advises caution

- 7X maternal mortality in Netherlands study
- hemorrhage, pulmonary embolism, sepsis
- anesthesia complications
- longer recovery time
- breastfeeding and bonding compromised
- subsequent pregnancies have higher risks

C-section also poses risks for infants

- higher incidence of respiratory distress
- disrupted sleep rhythm
- challenges to self-regulation
- shorter duration of breastfeeding
- low Apgar scores for infant
- mom not fully available
 - difficulty establishing breastfeeding
 - vocal, visual, tactile interaction delayed
 - oxytocin and prolactin secretion patterns altered

Long-term effects of cesarean section for infants

- 20% greater risk of developing type one diabetes
- greater risk of asthma in childhood and adulthood
- numerous factors related to not being breastfed
- there may be more...

labor and delivery may be
“good for” babies

contractions of labor stimulate **respiration**,
elimination, and development of the nervous
system

– replaced **licking of most mammalian mothers**

- (Ashley Montagu, 1960s)

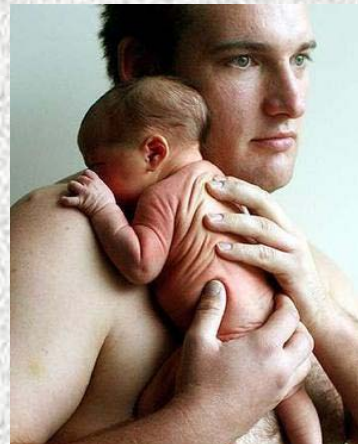
Evidence that labor and delivery are “good for” babies

“stress hormones” from mom during labor
contractions

- help speed up lung development in infant.
- increase fetal blood flow to brain
- increase availability of calories to fetus
- stimulate development of immune function
- promote bonding

Recommendations from evolutionary medicine

- allow labor to be initiated whenever possible
- provide massage to infants delivered by cesarean section
- skin-to-skin contact with the father (or other)



C-section and epigenetics

- C-section babies had higher DNA-methylation in white blood cells compared with vaginally born infants
- Authors conclude that DNA-methylation is “more dynamic around birth than previously known.” (p. 1098)
- May provide link between increased c-section rates and later-life diseases like obesity, diabetes, and asthma.
- May provide links to developmental disorders we are exploring in this conference.

Birth and epigenetics

- Birth environments and experiences may have profound effects on epigenomes
- May be reversible, but we need to know about them.
- Some of the mechanisms by which genes and environments interact to produce adult phenotypes may have their origin in not only in prenatal but also in perinatal processes.

The first hour after birth is the most important hour in a person's life – we need to pay more attention to it.