



UNIVERZITET U NOVOM SADU
POLJOPRIVREDNI FAKULTET
Department za stočarstvo



FERTILIZACIJA I GRAVIDNOST

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Reprodukcija domaćih životinja



Novi Sad, 2007.

Mesto penetracije penisa, ejakulacije i deponovanje sperme kod VO

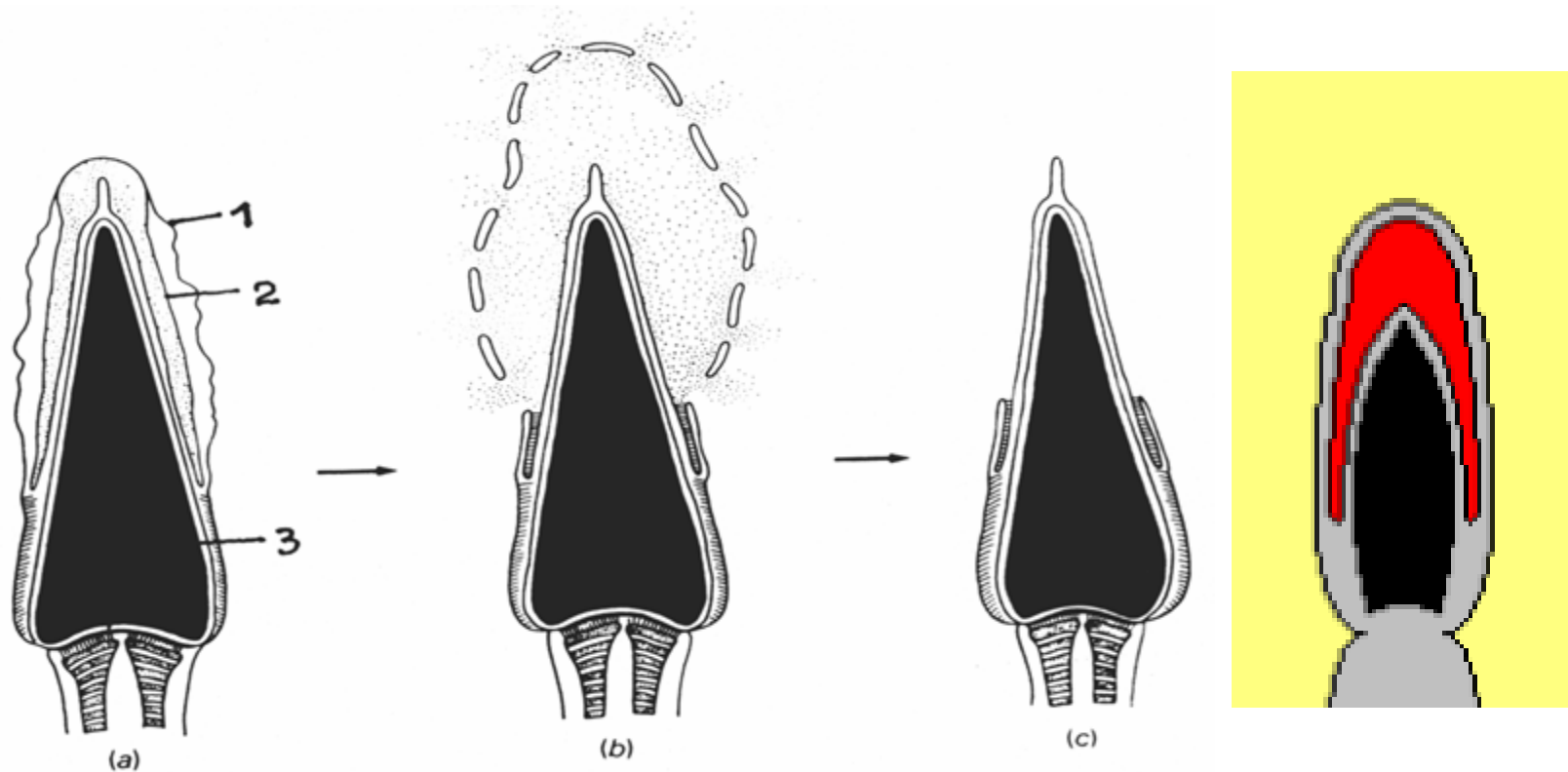
	NERAST	PASTUV	BIK	OVAN JARAC
Penetracija glans penisa	<i>Duboko u cerviks</i>	<i>Glans penisa se priljubi uz otvor cerviksa</i>	<i>Forniks vagine</i>	<i>Forniks vagine</i>
Mesto ejakulacije	<i>Telo materice</i>	<i>Cerviks</i>	<i>Forniks vagine</i>	<i>Forniks vagine</i>
Mesto depozicije doze sperme kod VO	<i>Telo materice</i>	<i>Cerviks</i>	<i>Cerviks</i>	<i>Cerviks</i>

vrsta	Anatomical diagrams with numbered labels (1-5)	Mesto ejakulacije
Bik, Ovan, Jarac	Diagram showing the reproductive tract of a ruminant with labels 1, 2, 3, 4, and 5.	<i>Fornix vaginalae</i>
Nerast	Diagram showing the reproductive tract of a horse with labels 1, 2, 3, 4, and 5.	<i>Corpus uteri</i>
Pastuv	Diagram showing the reproductive tract of a pig with labels 1, 2, 3, 4, and 5.	<i>Cervix uteri</i>

Mesto ejakulacije, kod pojedinih vrsta domaćih životinja

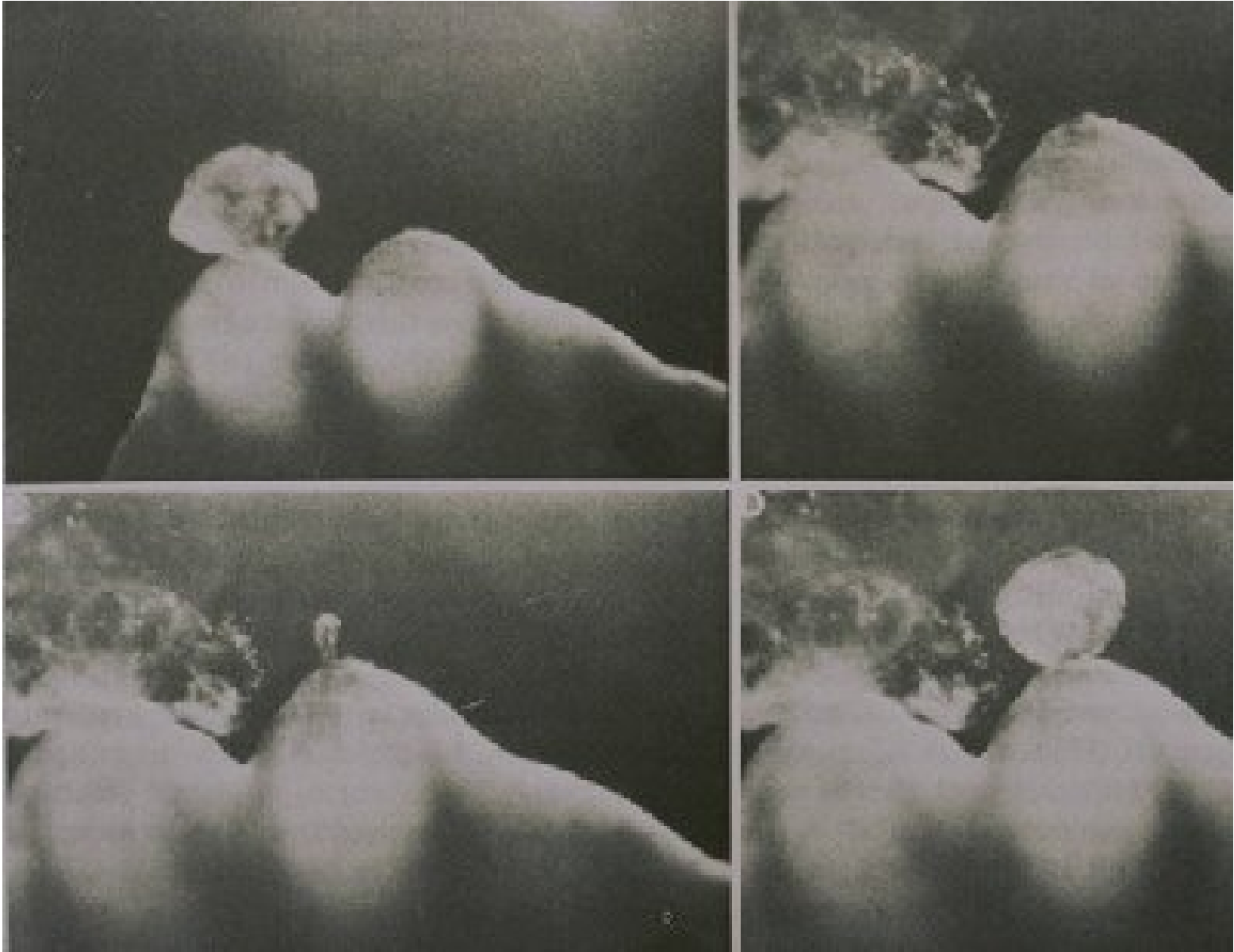
KAPACITACIJA SPERMATOZOIDA

U procesu kapacitacije, koji se odvija u jajovodu, spermatozoidi stiču sposobnost za oplodnju. Kapacitacija se odvija u dva dela: **(1) denudacija**, tj. Skidanje mukopolisaharidne membrane sa spermatozoida i **(2) akrozomalna reakcija**.

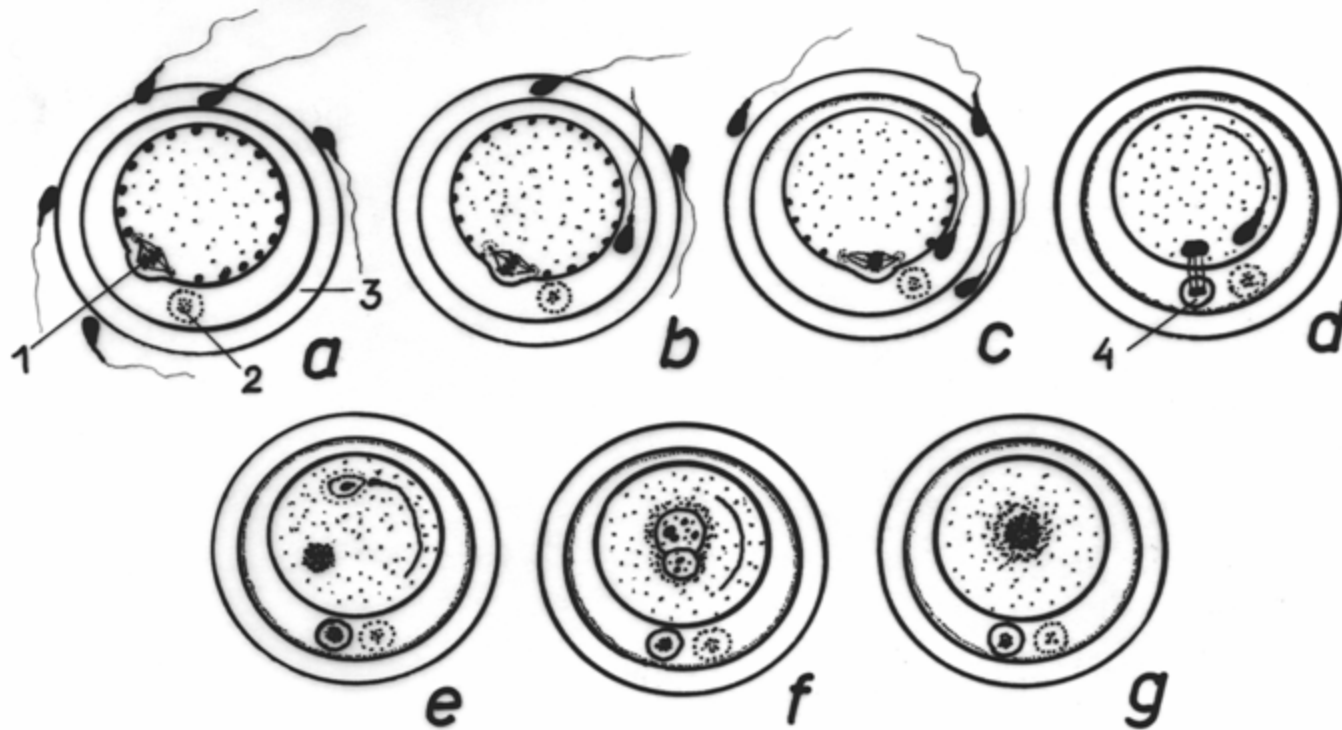


Akrozomalna reakcija: (a) početak spajanja membrane spermatozoida, sa spoljašnjom membranom akrozoma; (b) perforacije na akrozomu, nastale spajanjem ovih membrana; (c) spermatozoid bez akrozoma (posle penetracija zone pelucide jajne ćelije). 1-membrana spermatozoida; 2-spoljašnja membrana akrozoma; 3-nukleus.

PROCES OVULACIJE

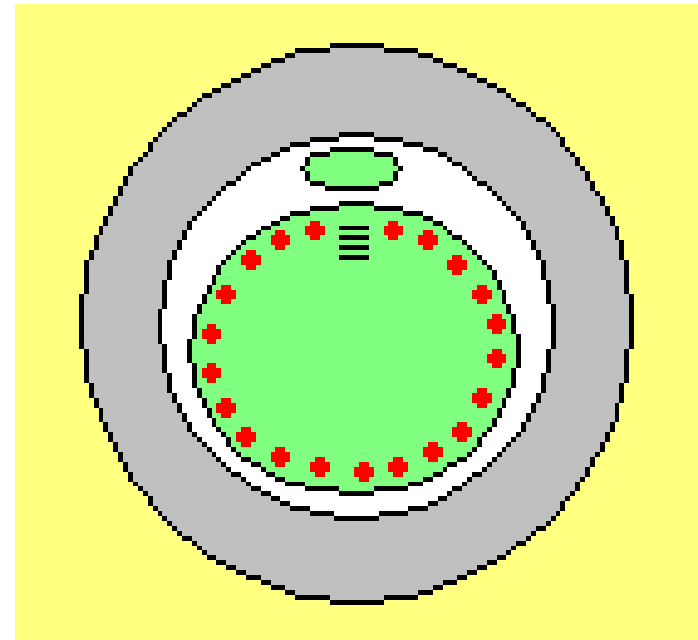
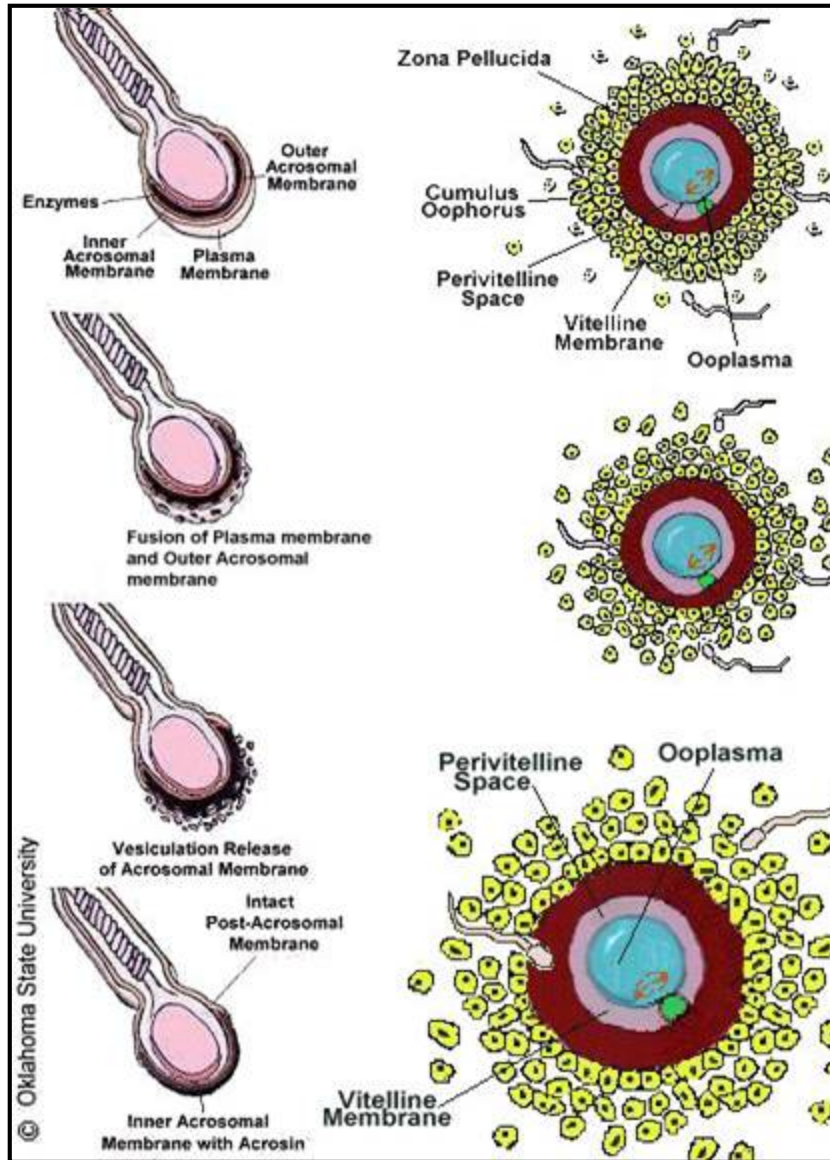


Osnovne faze procesa oplodnje

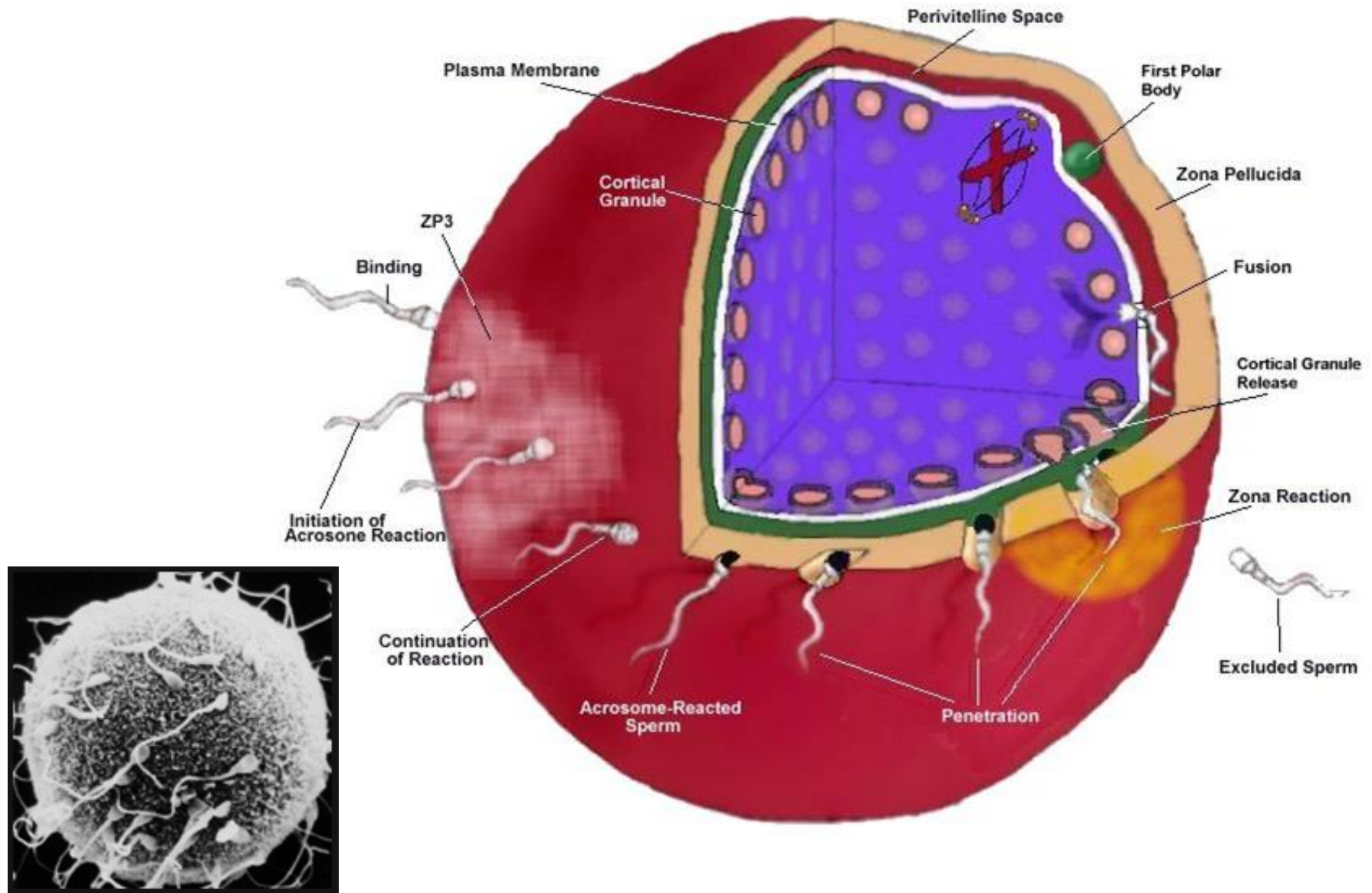


a – penetracija zone pelucide; **b** – pripajanje glave spermatozoida za perivitelusnu membranu oocita; **c** – raspad kortikalnih granula; **d** – nastavak druge mejotičke deobe neukleusa oocita i izbacivanje 2. polarnog tela u perivitelusni prostor (c i d = aktivacija oocita spermatozoidom); **e** – ulaz spermatozoida u vitelus oocita i formiranje muškog i ženskog pronukleusa, sa haploidnim (n) brojem hromozoma; **f**- singamija; **g** – oplodjena jajna ćelija (zigot), u stadijumu prvog jedra, sa diploidnim ($2n$) brojem hromozoma.

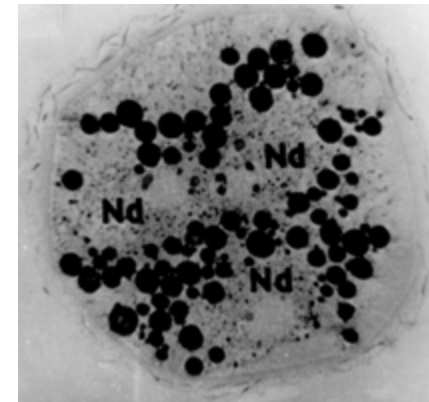
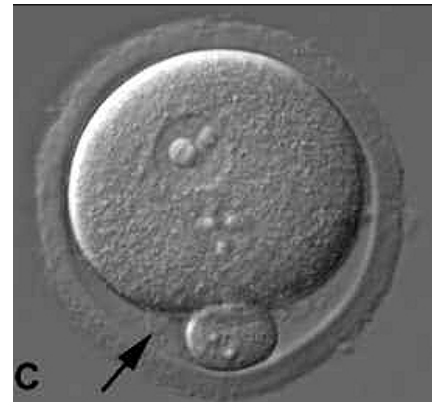
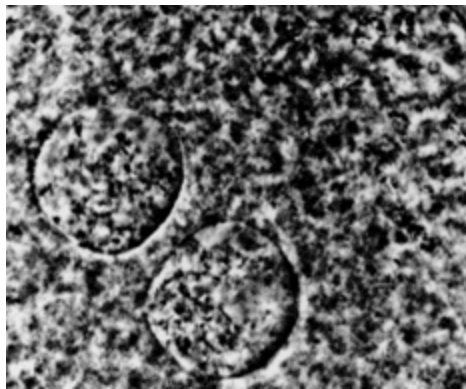
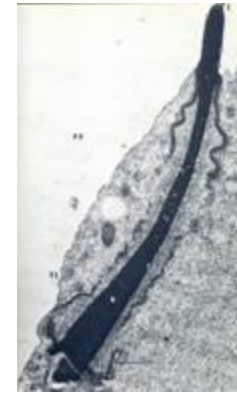
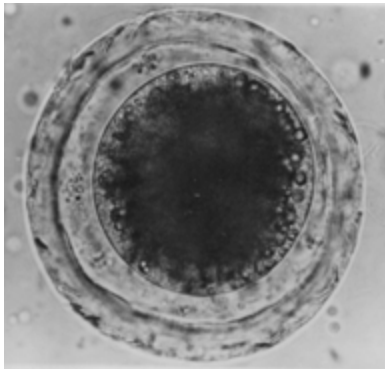
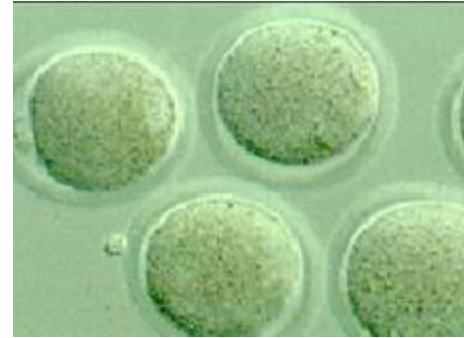
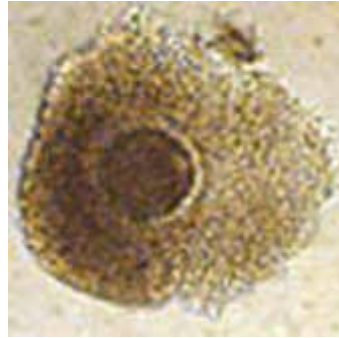
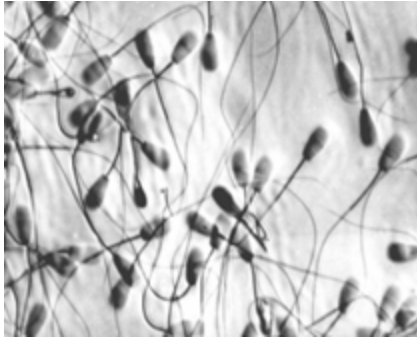
Penetracija spermatozoida kroz kumulus ooforus jajne ćelije

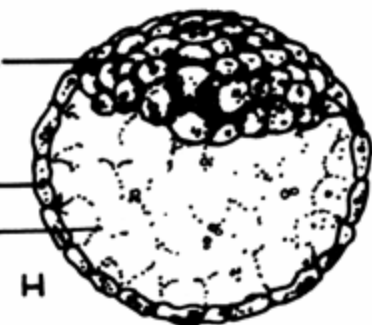
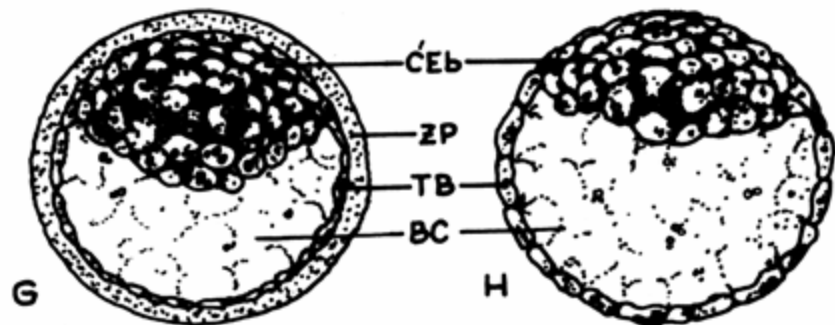
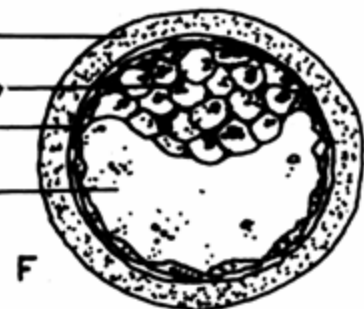
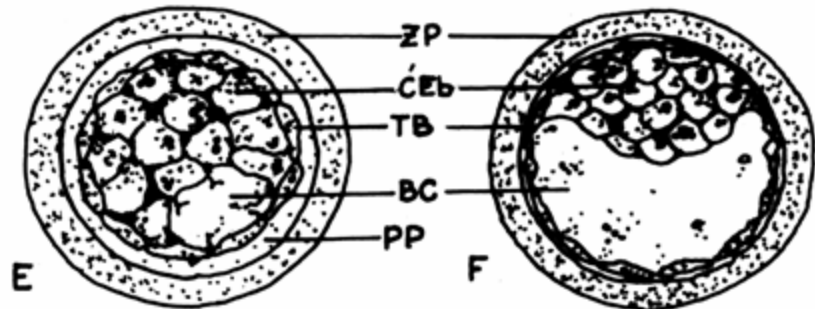
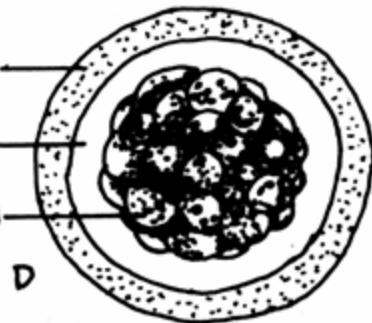
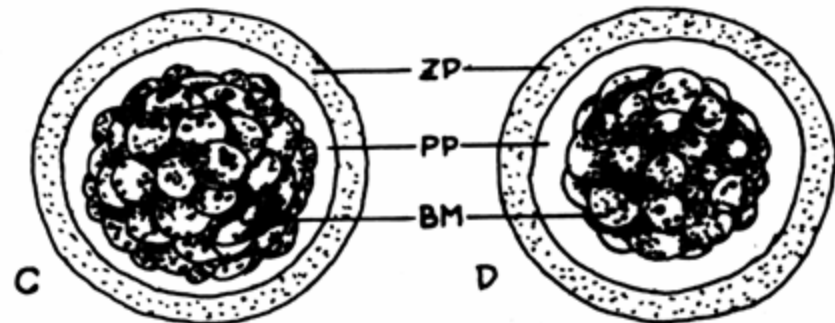
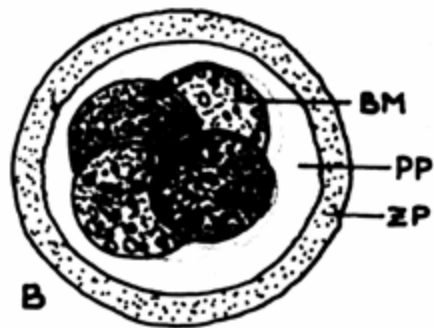
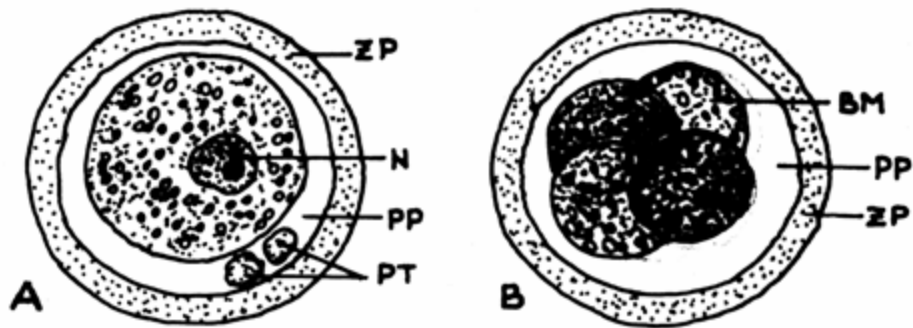


Penetracija spermatozoida kroz zonu pelucidu i aktivacija jajne ćelije



OSNOVNE SEKVENCE PROCESA OPLODNJE

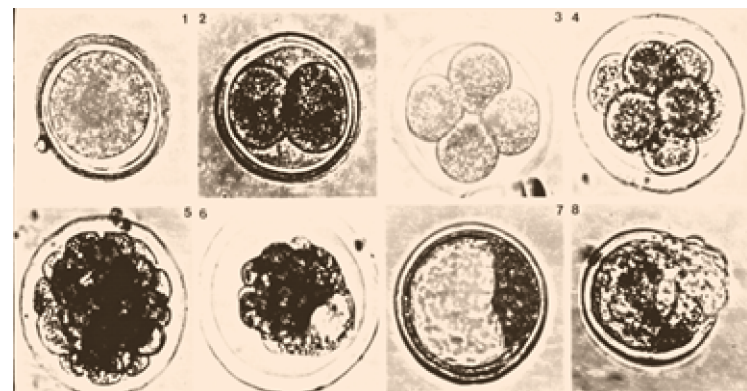


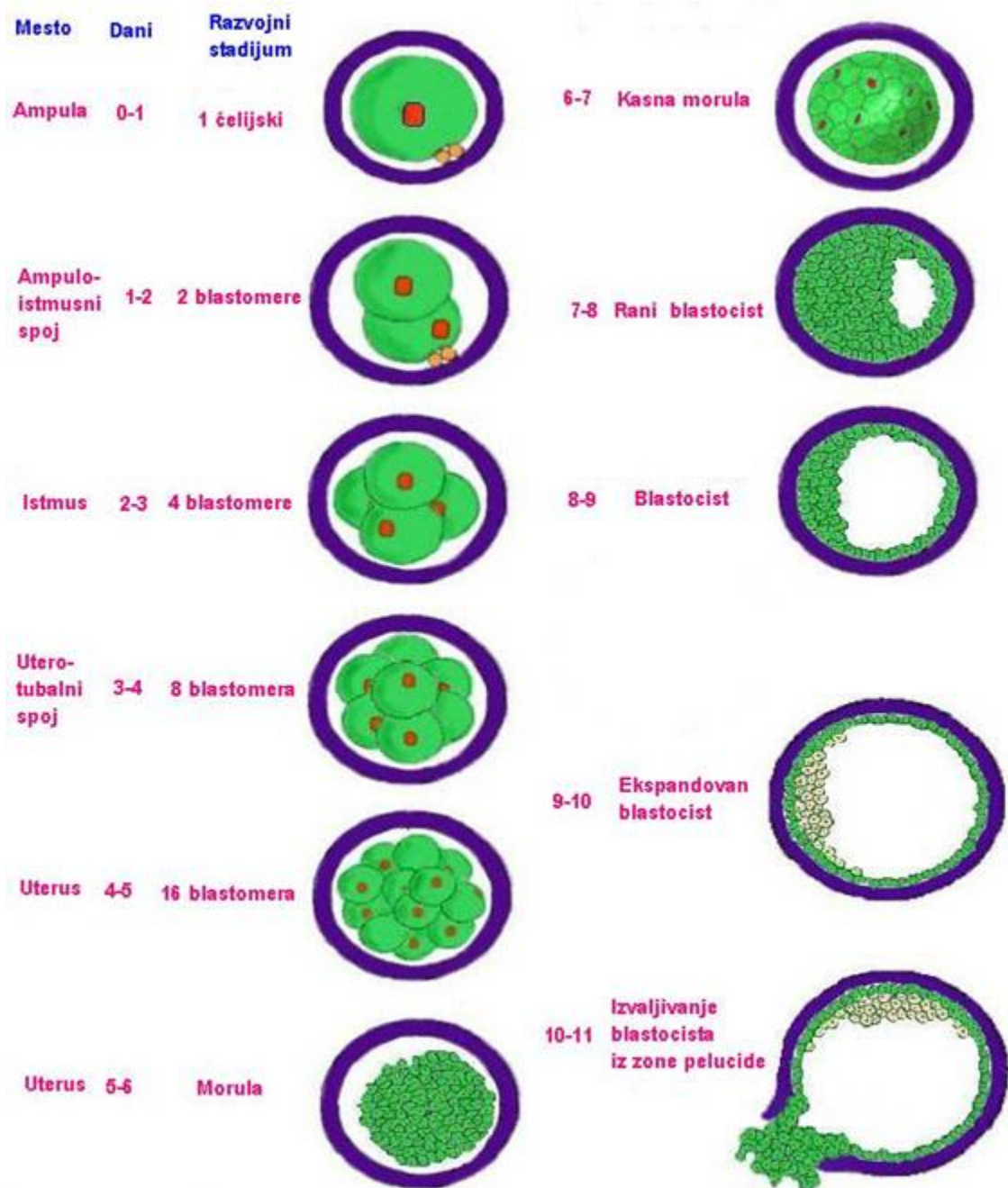


RAZVOJNI STADIJUMI RANIH EMBRIONA

A-oplošena jajna ćelija; **B**-embrion sa 4 blastomere; **C**-rana morula; **D**-kasna morula; **E**-rani blastocist; **F**-razvijen blastocist; **G**-ekspandovan blastocist; **H**-izvaljen blastocist.

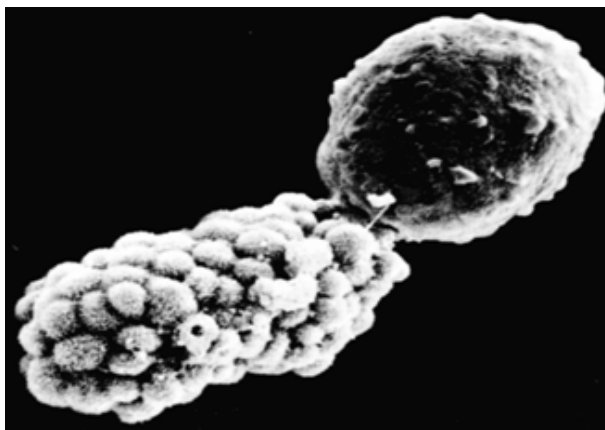
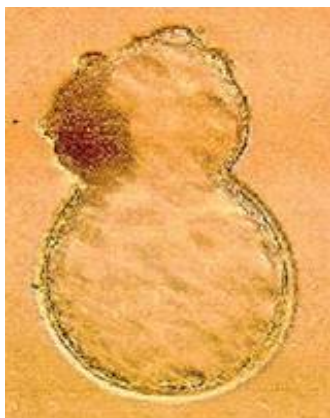
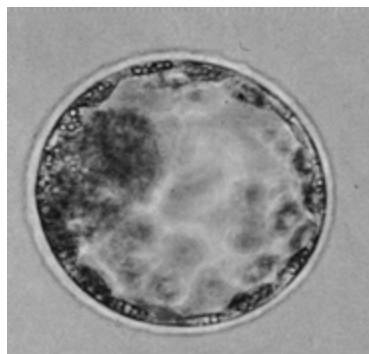
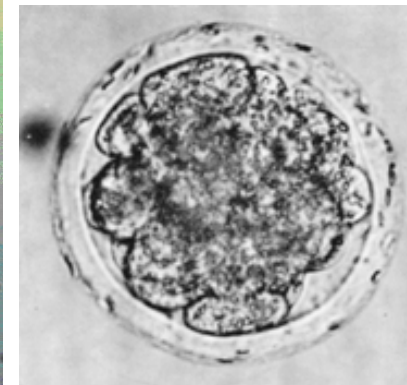
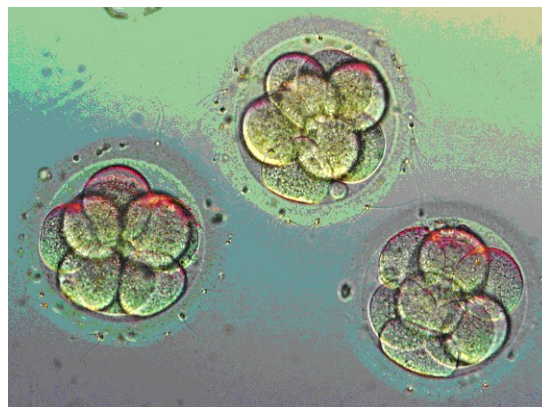
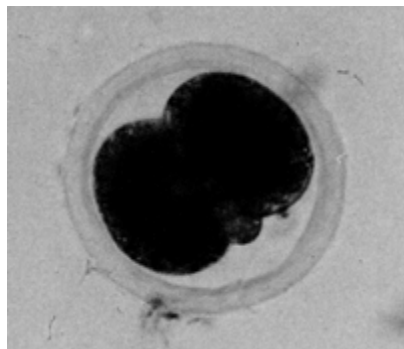
ZP-zona pelucida; **N**-nukleus; **PP**-perivitelusni prostor; **PT**-polarna tela; **BM**-blastomere; **čeb**-ćelije blastocista (unutrašnja ćelijska masa); **TB**-trofoblast (trofektoderm); **BC**-blastocel (ćupljina blastocista).



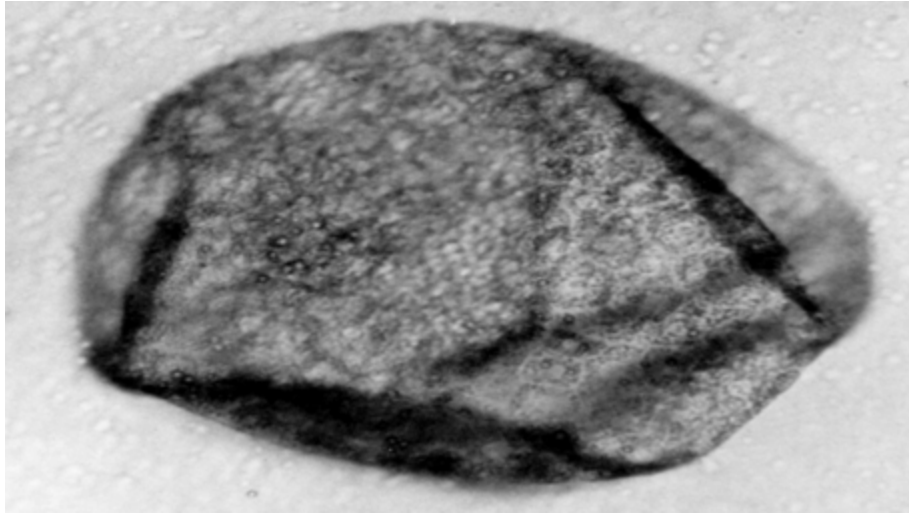


**STAROST POJEDINI
RAZVOJNIH
STADIJUMA RANIH
EMBRIONA GOVEDA**

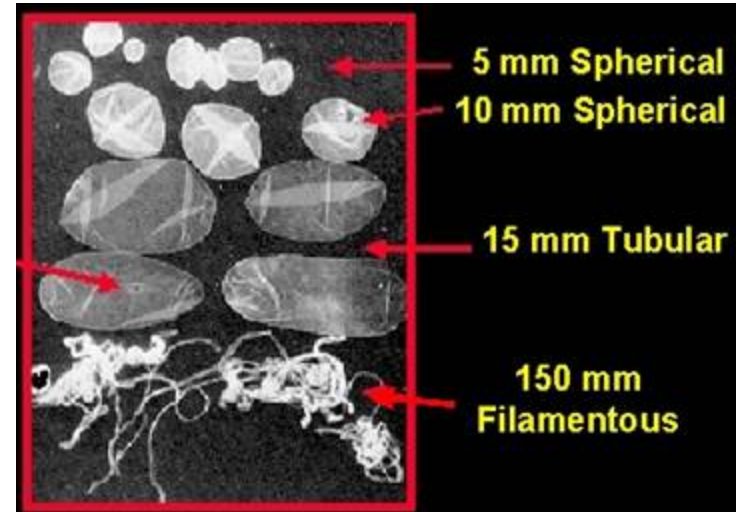
RAZVOJNI STADIJUMI RANIH EMBRIONA



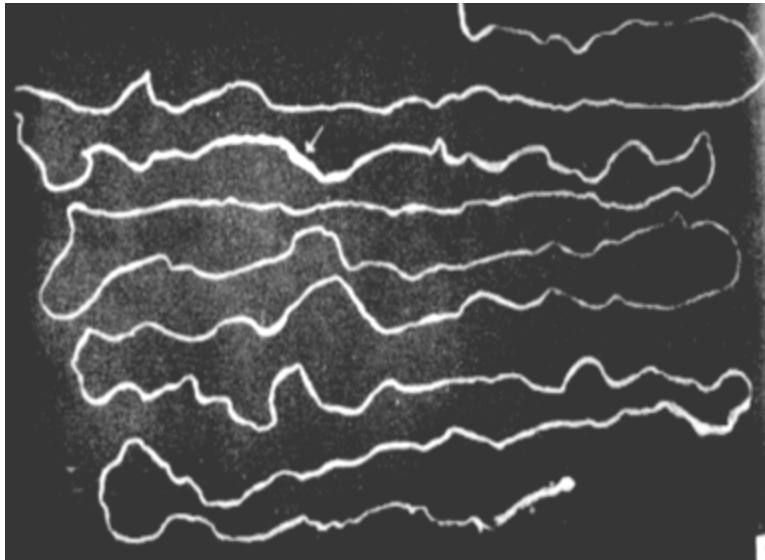
PROCES ELONGACIJE TROFOBLASTA



Ovalni trofoblast (9-10 dana star)



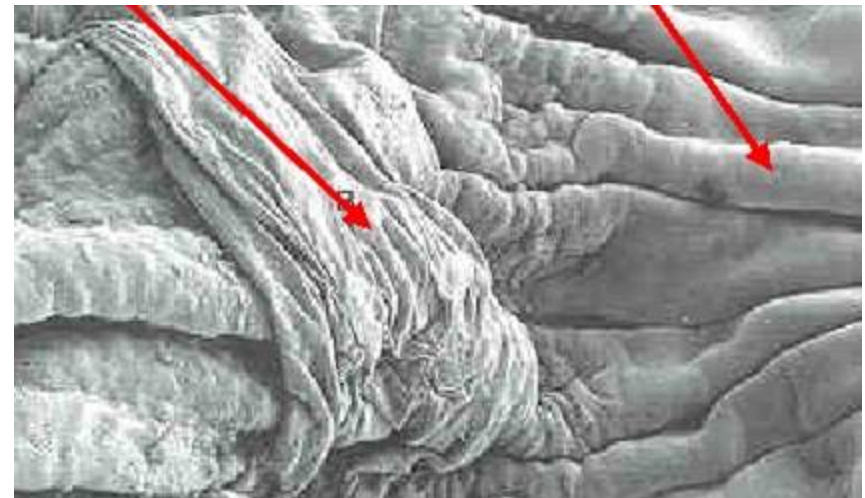
Razvoj embriona svinje od 10. do 12. dana



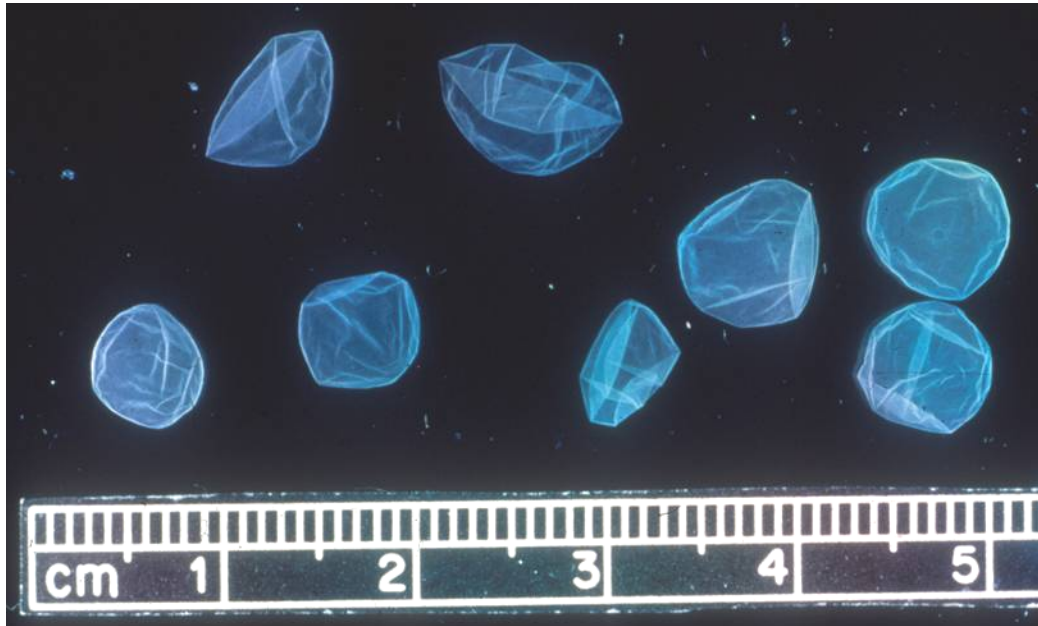
Elongiran trofoblast svinje (12 do 13 dana)

Trofoblast

Endometrium



Elektronska mikrofotografija eleongiranog trofoblata svinje (14 dana starog)

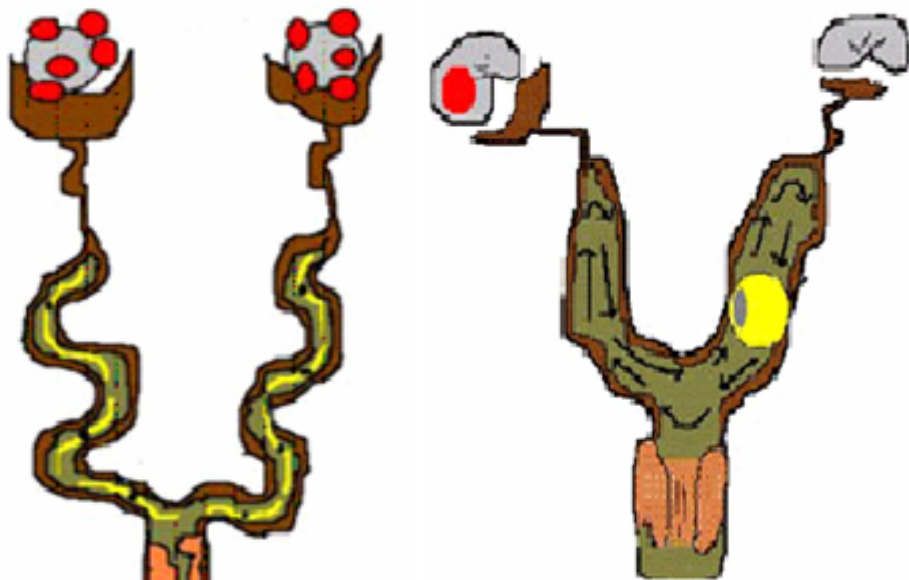


**SFERICI
BLASTOCISTI**



**ELONGIRANI
BLASTOCISTI**

“Materinsko prepoznavanje” gravidnosti kod krmačice, krave i kobile

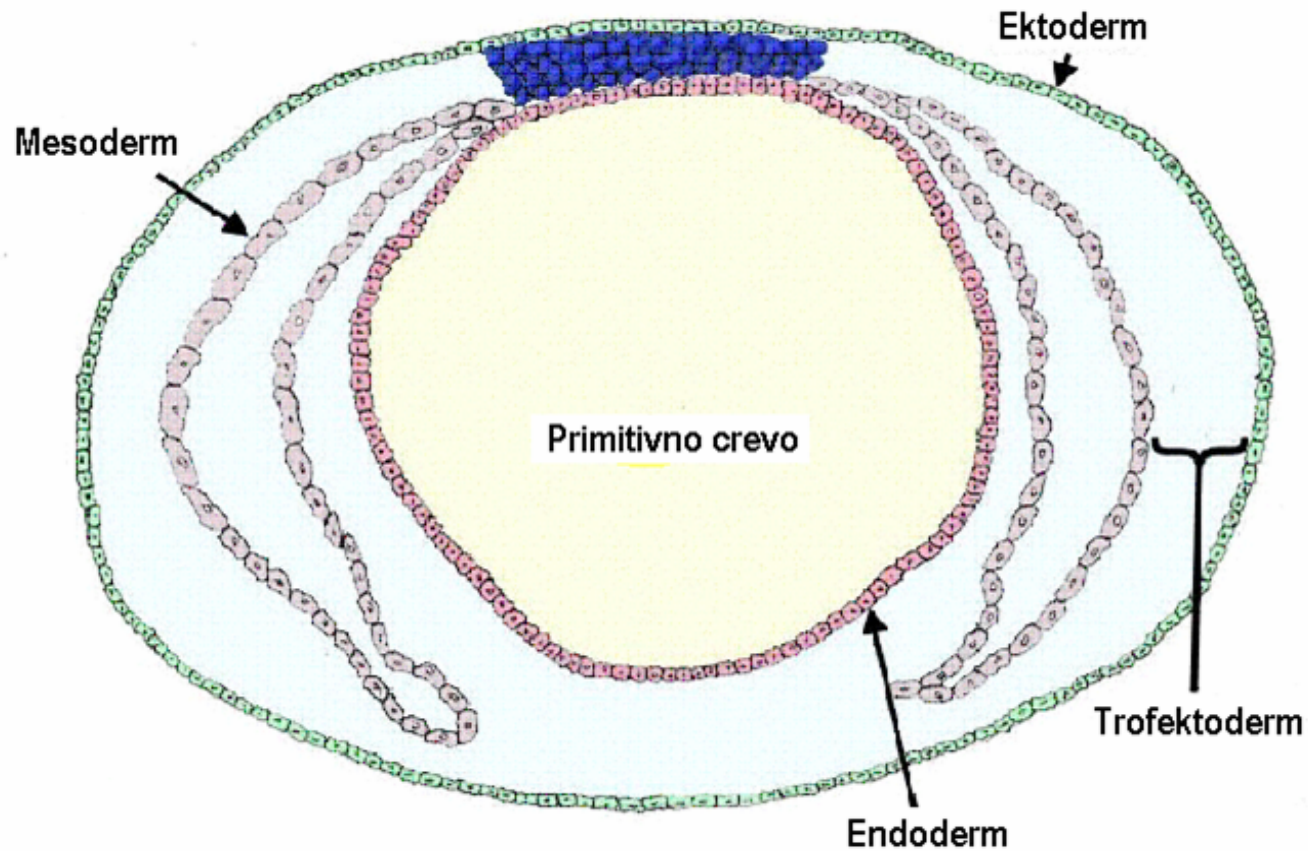


Embrioni svinje i kobile, stari 11 do 14 dana, izlučuju velike količine **estradiola**. Estradiol sprečava prelaz $\text{PGF}_{2\alpha}$ iz uterusa u venske sudove, nego ga preusmerava u lumen uterusa. Tako ovaj prostaglandin ne stiže do jajnika i ne vrši regresiju žutih tela. To je tzv. **fenomen “materinskog prepoznavanja gravidnosti”**



Embrioni preživara (krava, ovca, koza), stari 11 do 14 dana, izlučuju **trofoblastin**, koji inhibira sintezu $\text{PGF}_{2\alpha}$ u endometriumu. Tako se sprečava luteoliza (regresija CL).

FORMIRANJE POJEDINIH TKIVA I ORGANA IZ EMBRIONALNIH LISTOVA



EKTODERM: epidermis, dlaka, rožina, nervni sistem, ušna, mlečna žlezda.

MESODERM: somiti, mišično tkivo, kardiovaskularni i limfni sistem, vezivno tkivo, kosti, ligamenti, tetive, reproduktivni trakt, bubrezi, mokraćni kanali.

ENDODERM: žlezde, jetra, pankreas, digestivni trakt, pluća, primordijalne germinativne celije.

Day 27 Bovine Placenta



Day 32 Equine Conceptus



Day 45 Equine Conceptus



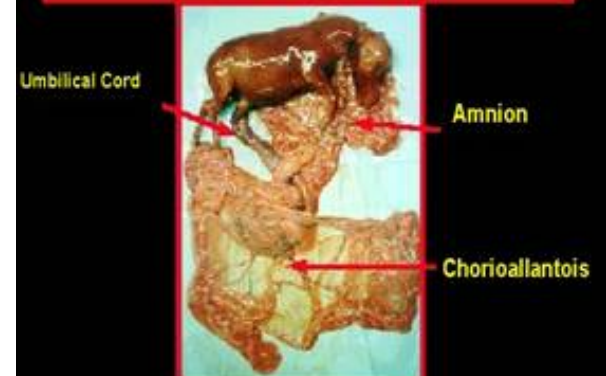
Day 40 Placenta - Amnion



Day 40 Fetus

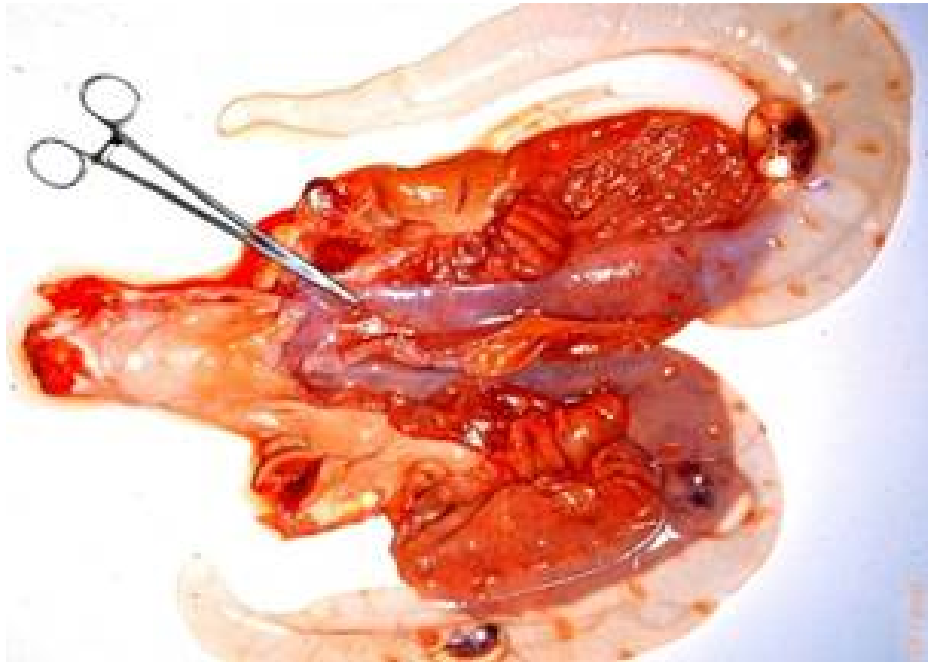


Equine Fetal Membrane Day 140

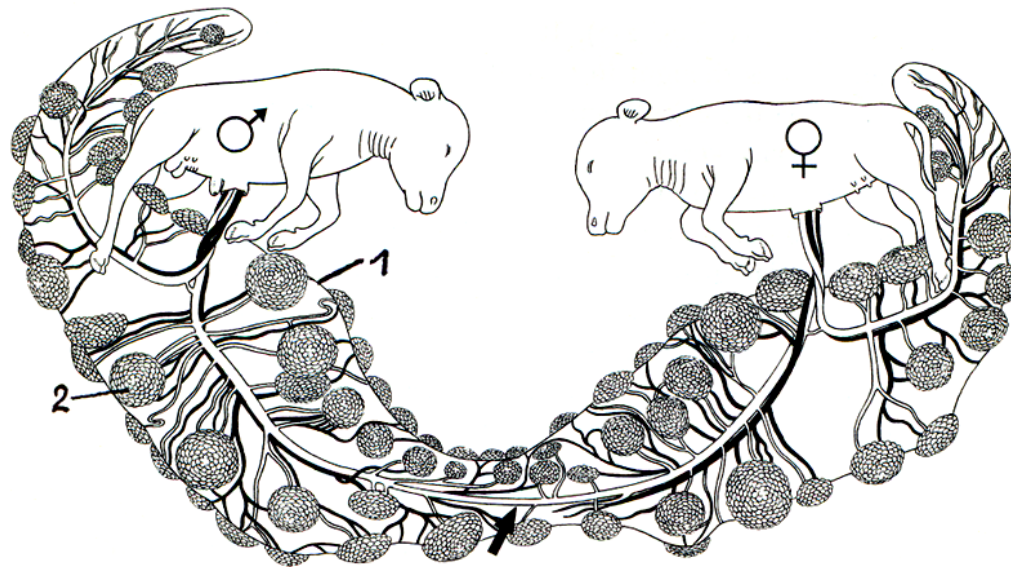




Blizanci krave

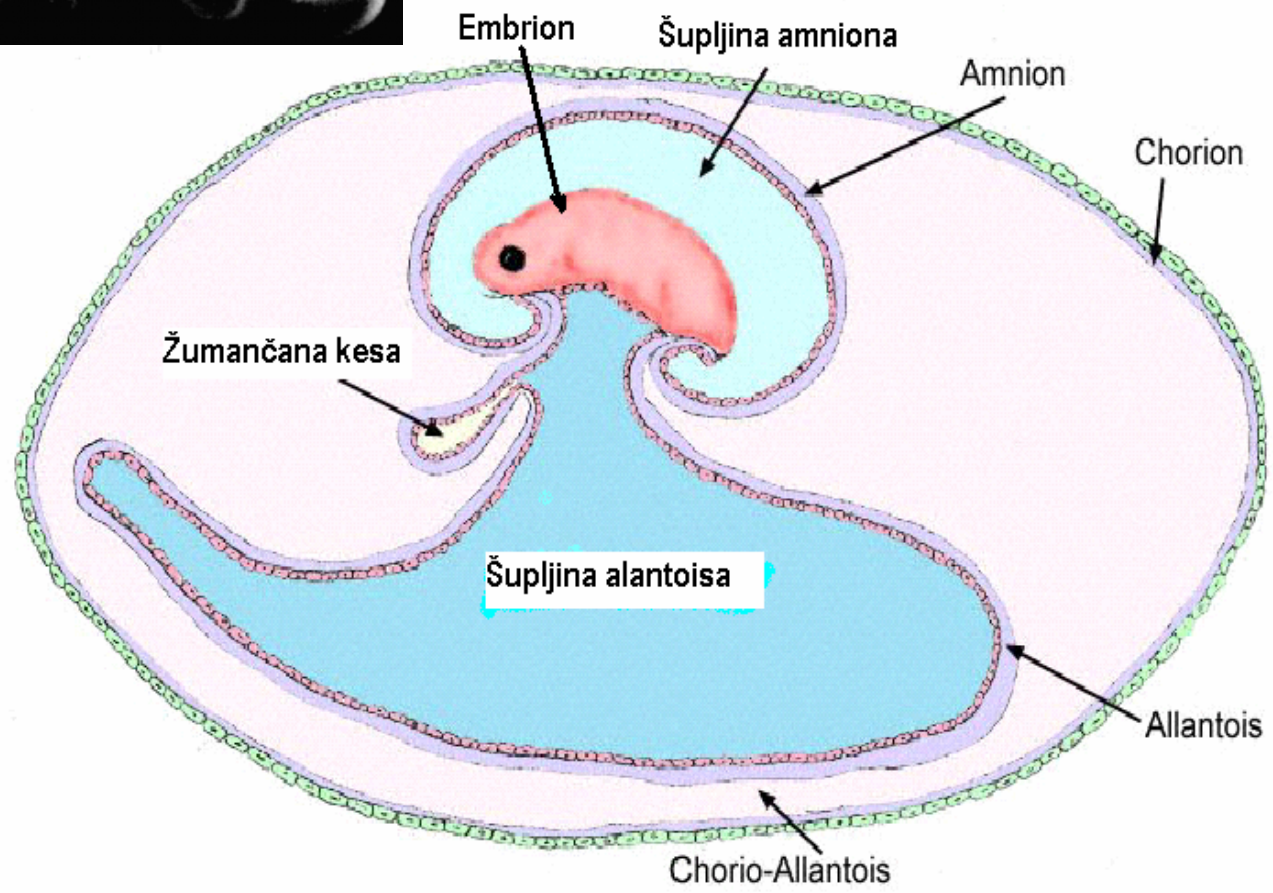
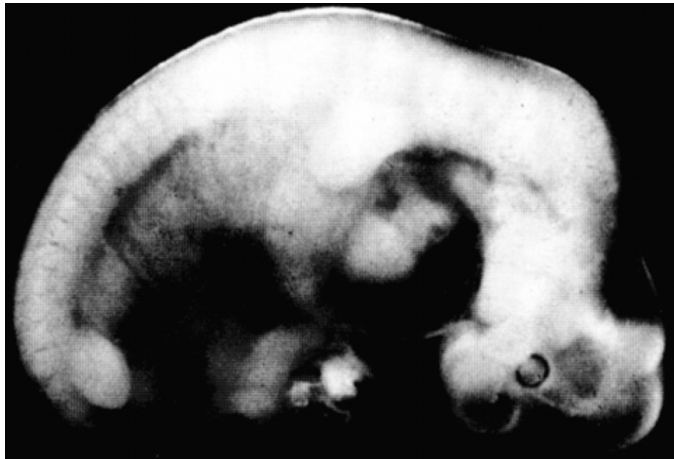


Trojke krave
(oko 50. dana gravidnosti)

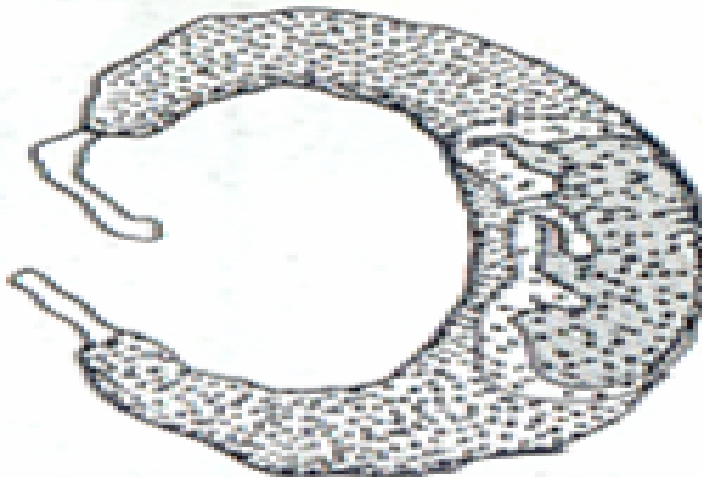


Frimartinizam goveda: 1 – horion; 2 – placentom. Strelica pokazuje anastomozu placentalnih krvotoka muškog i ženskog ploda.

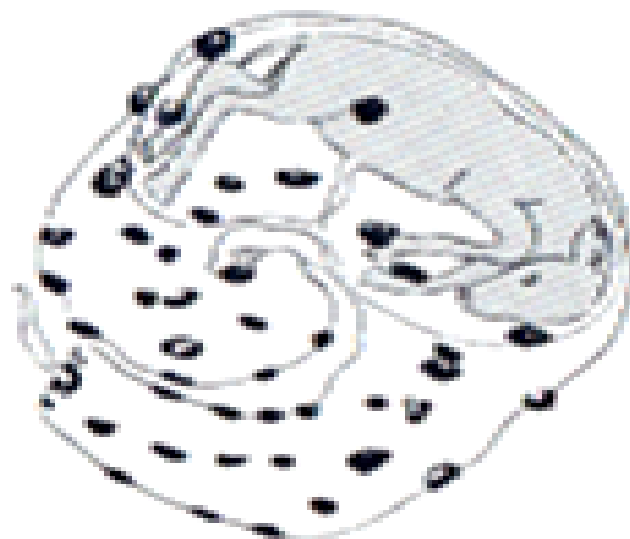




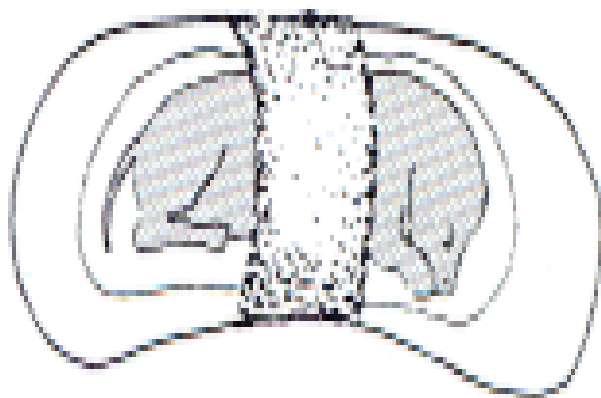
TIPOVI PLACENTE PREMA RASPOREDU HORIONSKIH RESICA



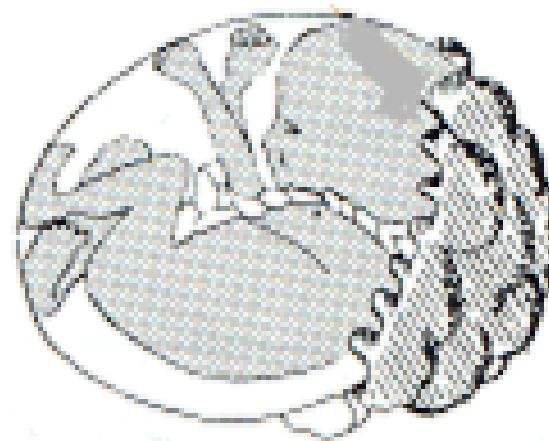
Placenta diffusa (krmač, kobila)



Placenta cotyledonaria (preživari)

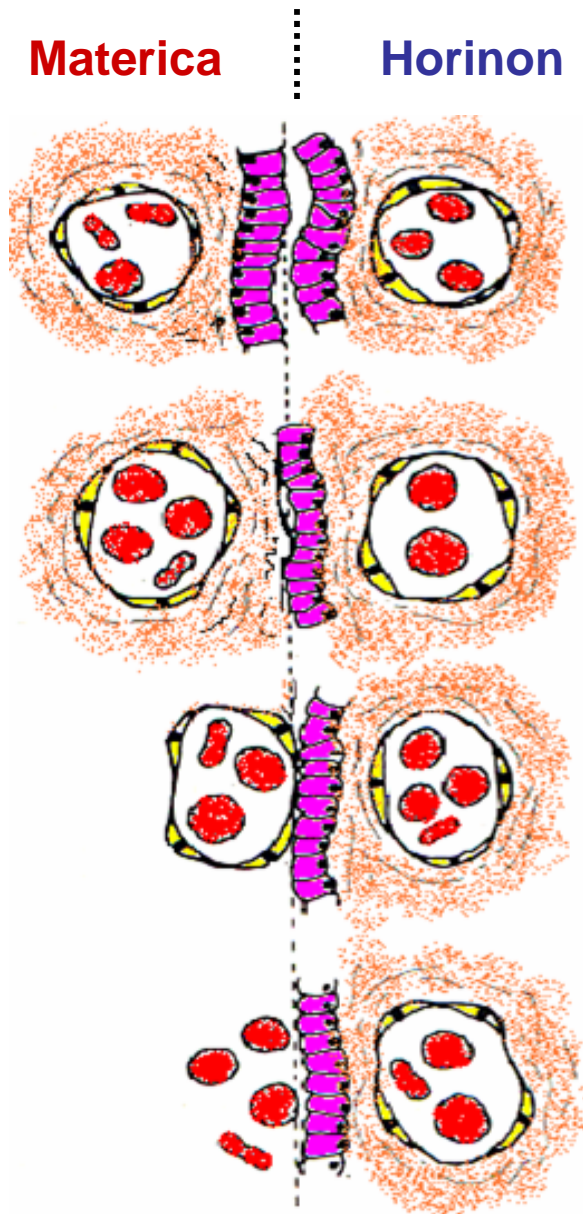


Placenta zonaria (mesojedi)



Placenta discoidalis (primati, čovek)

Tipovi placente prema kontaktnim tkivima horiona i endometriuma

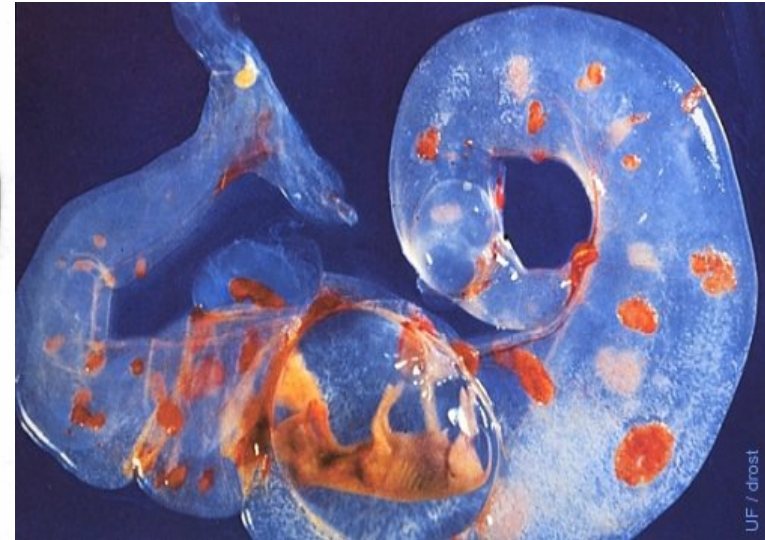
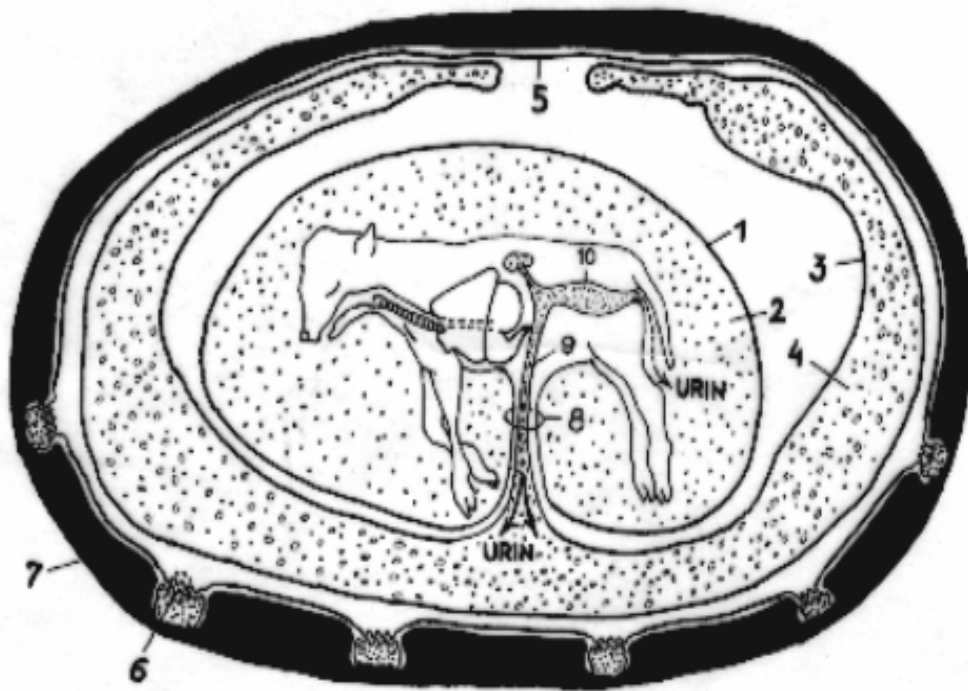


Placenta epitheliochorialis (krmač, kobila).
Epitel resice horiona, naleže na epitel endometriuma.

Placenta syndesmochorialis (preživari).
Epitel resice horiona naleže na vezivno tkivo endometriuma.

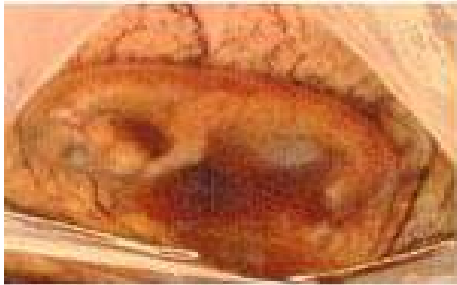
Placenta endotheliochorialis (mesojedi).
Epitel resice horiona naleže na endotel (zid) krvnih kapilara endometriuma.

Placenta hemochorialis (primati, miš, zec, pacov). *Epitel resice horiona direktno komunicira sa krvlju majke.*

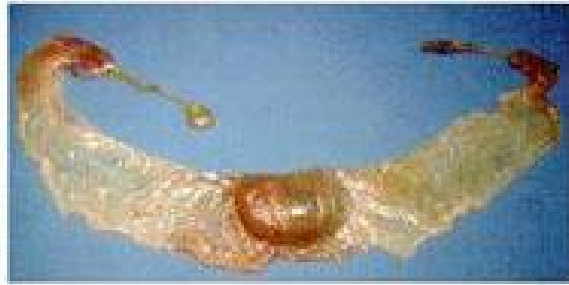


Plod i plodove ovojnice krave: 1-amnion; 2-amnionska teĳnost; 3-alantois; 4-alantoisna teĳnost; 5-horion; 6-placentom (karunkul+kotiledon); 7-zid materice; 8-umbilicus; 9-urachus; 10-mokraĳna beĳka. (Na fotografiji konceptus star 55 dana)

PLACENTA DYFFUSA

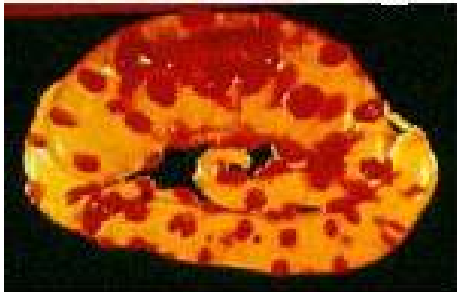


Kobila



Krmača

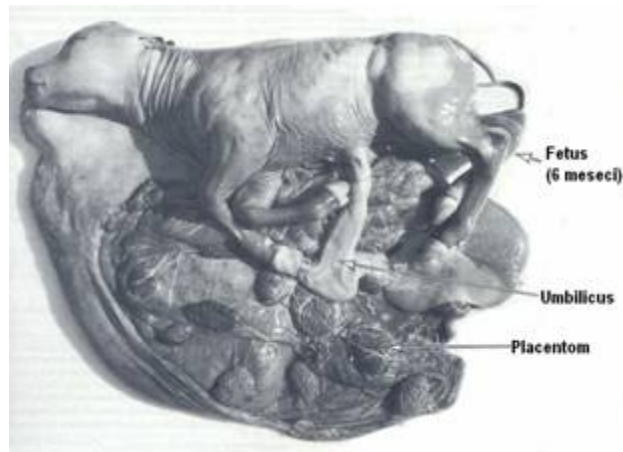
PLACENTA COTYLEDONARIA



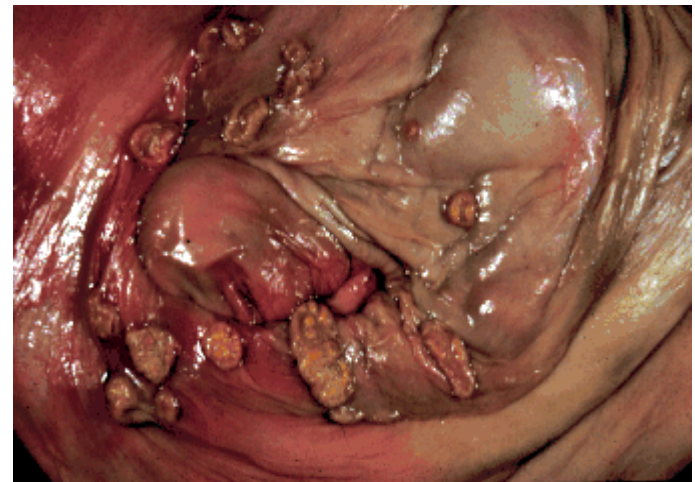
Ovca



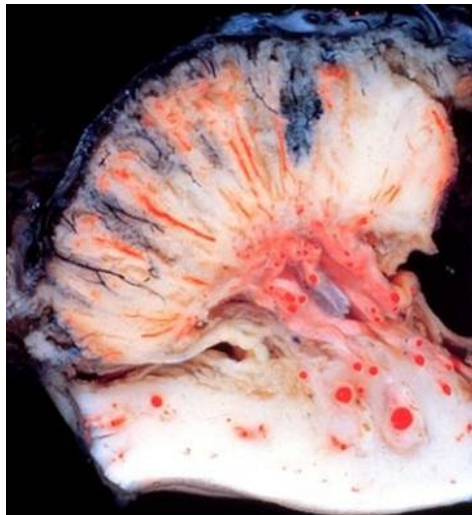
Krava



Placentalni krvni sudovi preko karunkula krave



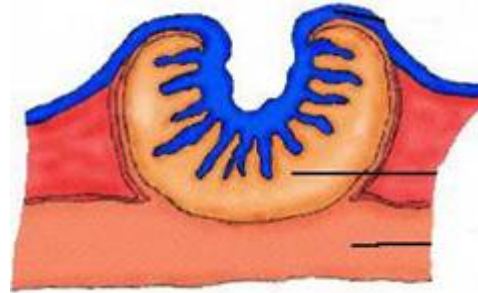
Endometrijalne kupe kobile, 140. dana gestacije



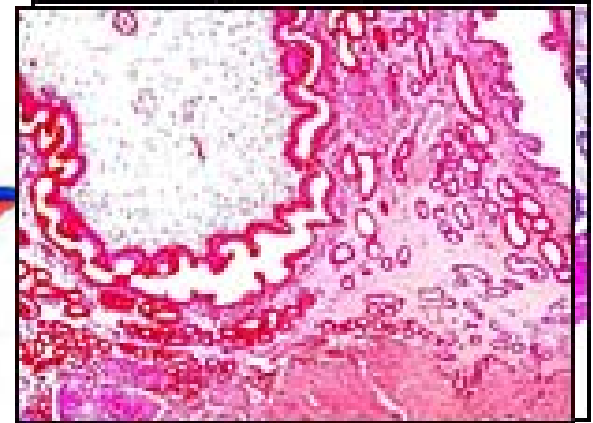
Kotiledon

Karunkul

Endometrium



Ovca



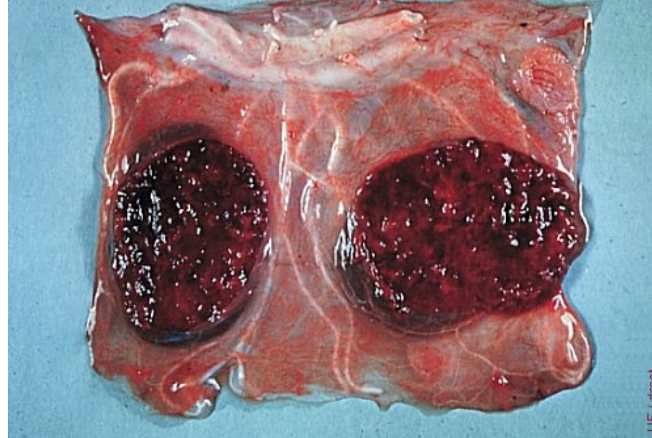
Krmača



Karunkul krave (konveksan)

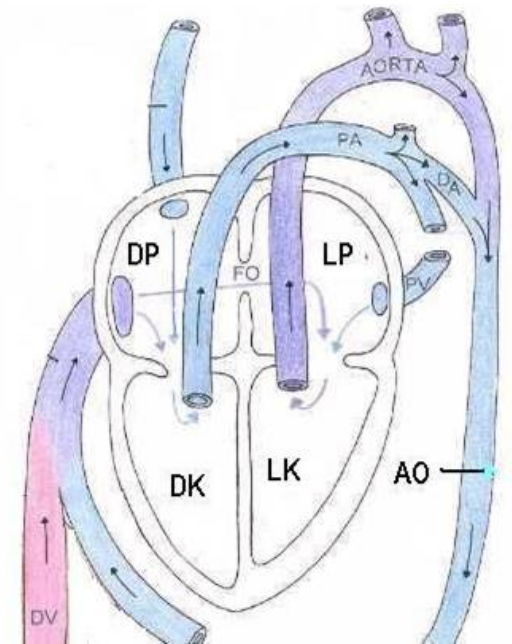
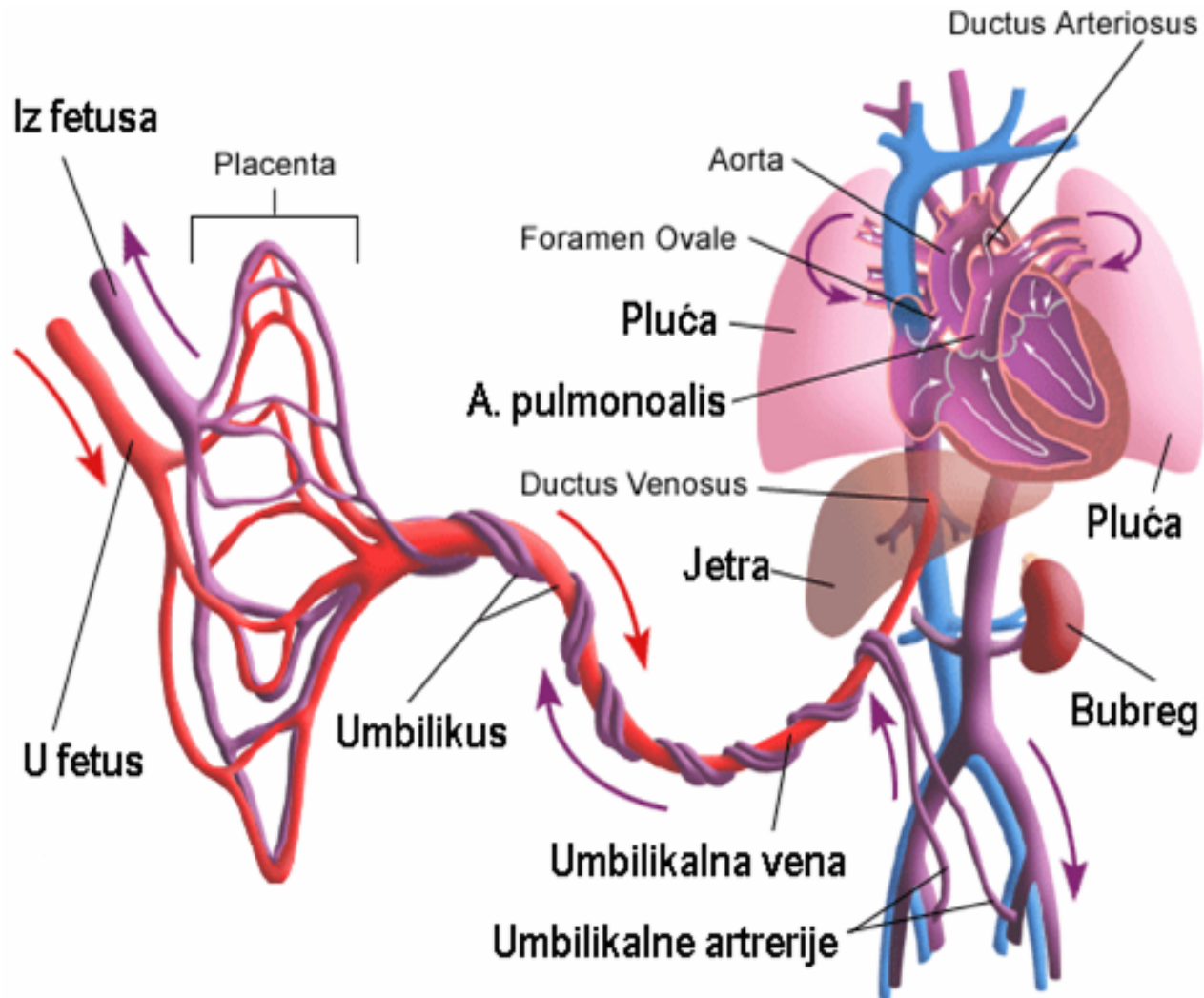


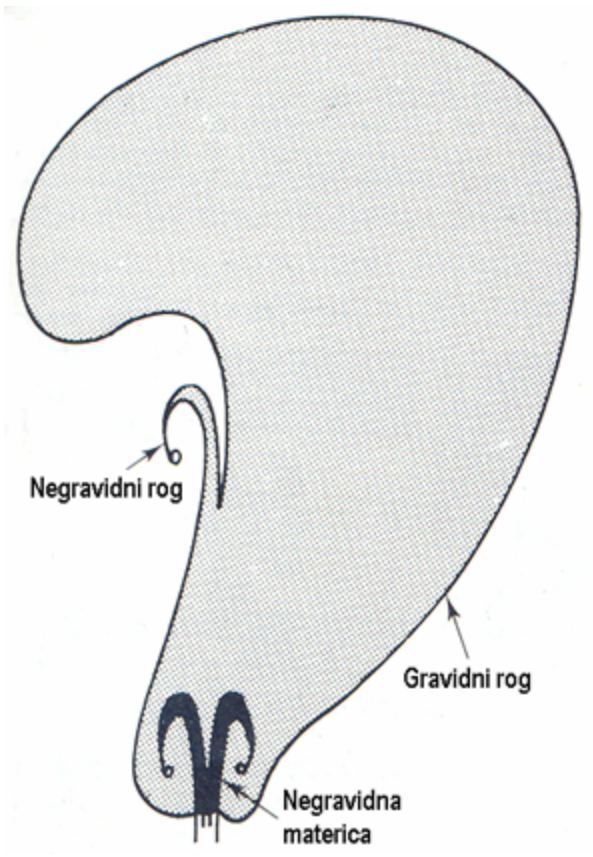
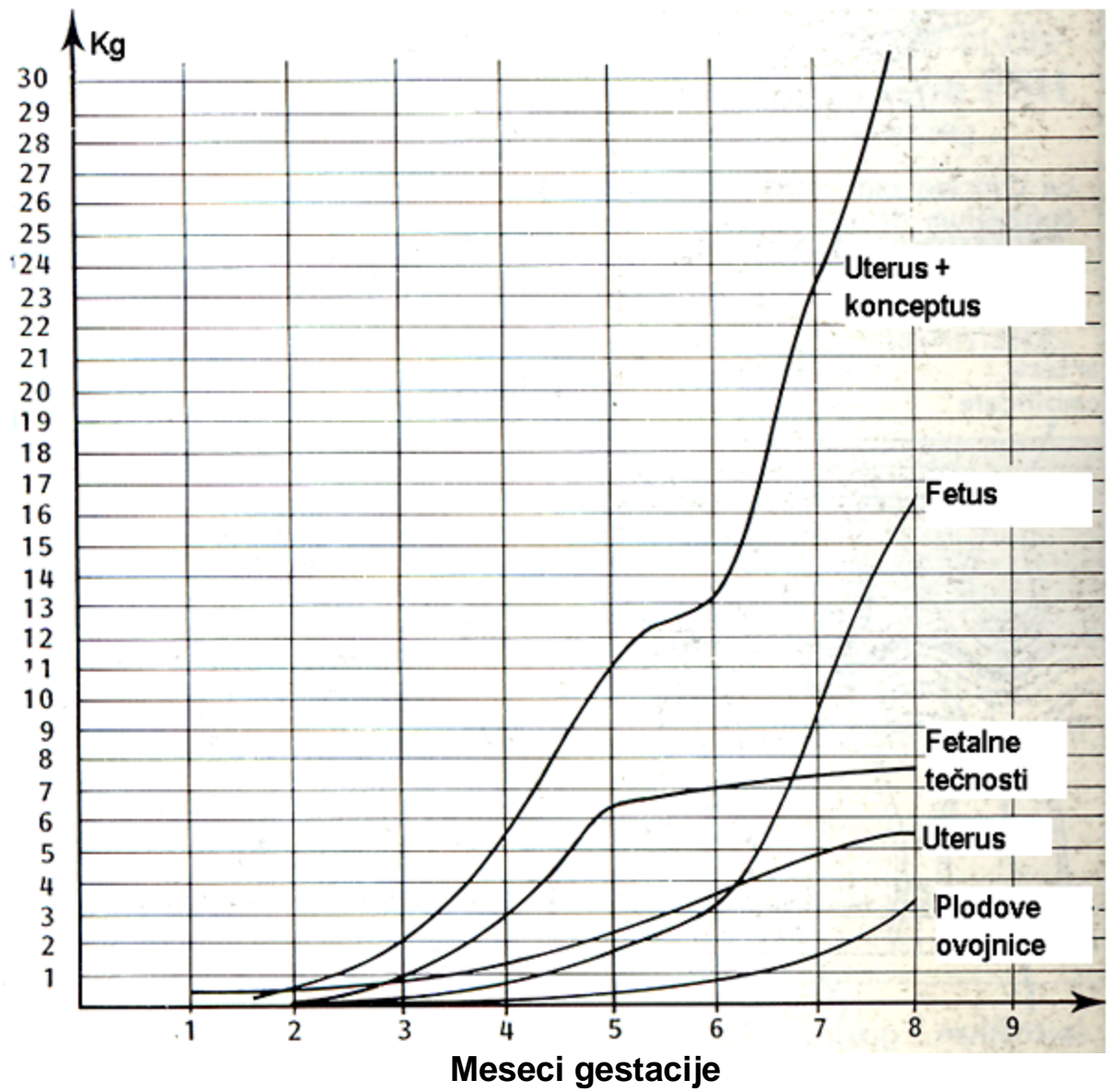
Karunkul koze (konkavan)



KARUNKULI I PLACENTOMI

FETALNI KRVOTOK





Odnos veličine negravidne i materice na kraju gravidnosti

Dinamika rasta ploda, podovih ovojnica, plodovih voda i uterusa, tokom gestacije krave

TRAJANJE GRAVIDNOSTI KOD POJEDINIH VRSTA DOMAČIH ŽIVOTINJA

Vrsta živalinja	Prosek (<i>granice</i>)
Goveda (mlečne rase)	279 (262 – 359)
Goveda (tovne rase)	285 (243 – 316)
Ovce	148 (140 – 159)
Svinje (domače rase)	114 (102 – 128)
Svinje (divlje)	(124 – 140)
Konji (toplokrvne rase)	337 (301 – 371)
Konji (hladnokrvne rase)	344 (316 – 363)