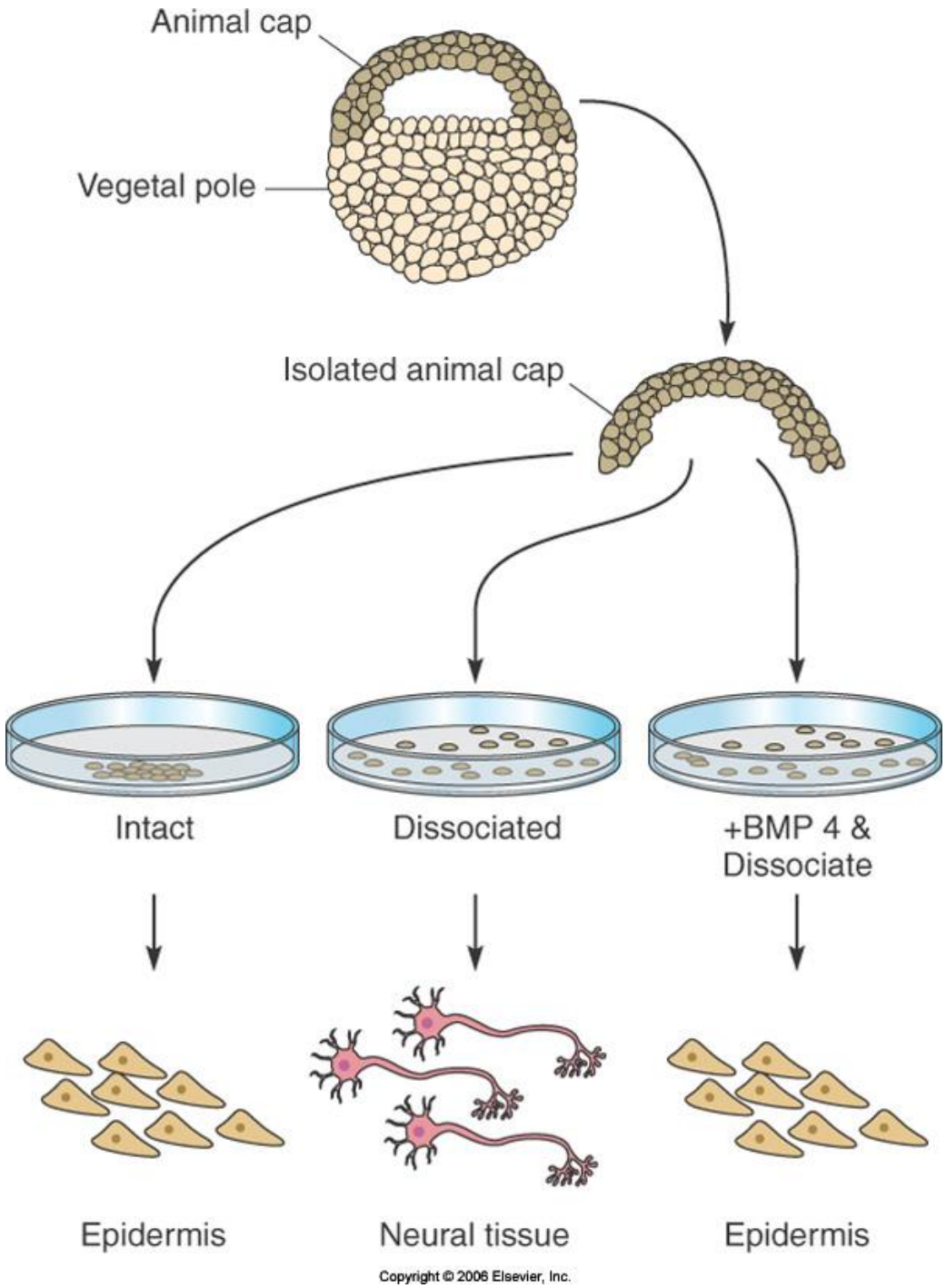
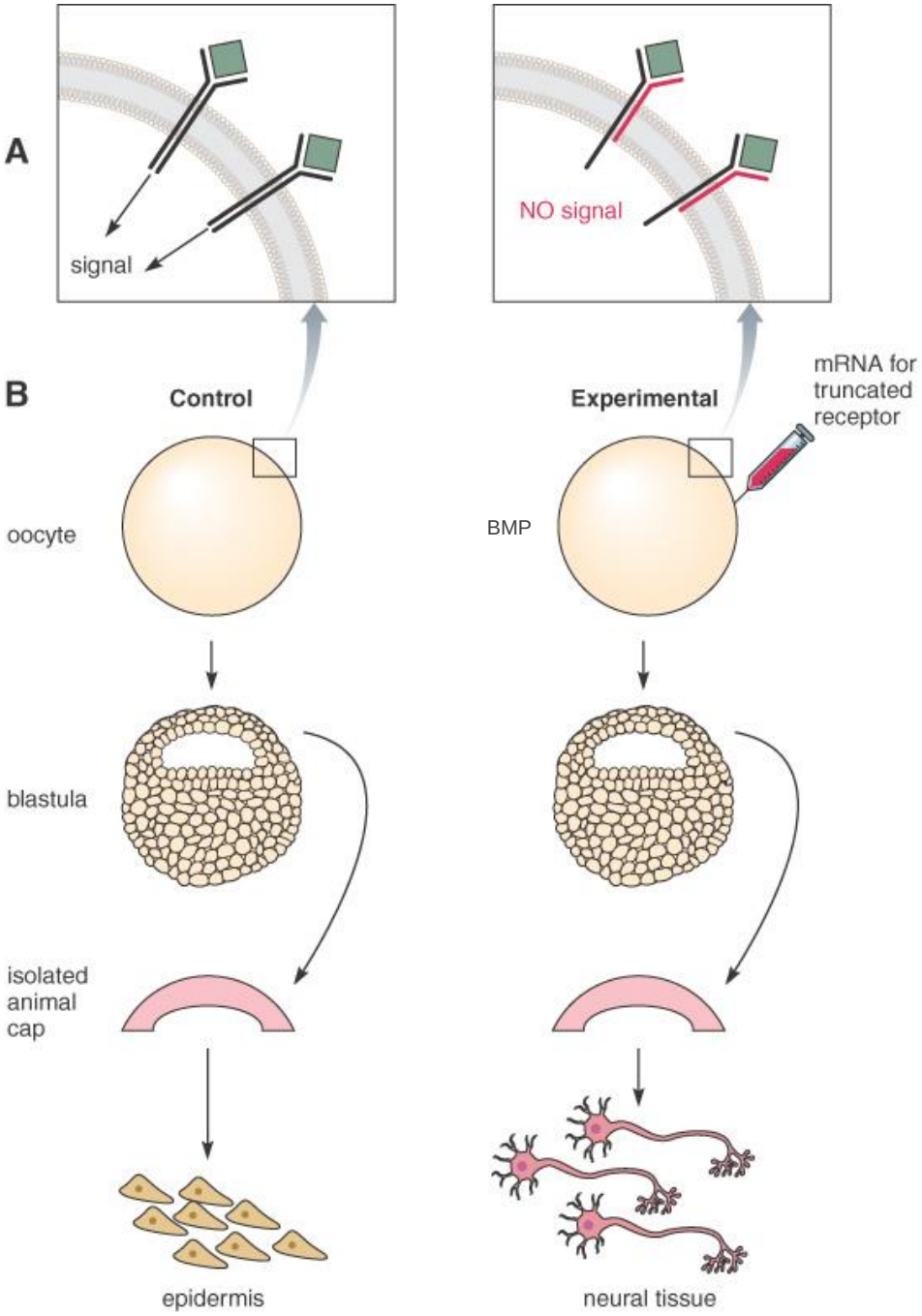
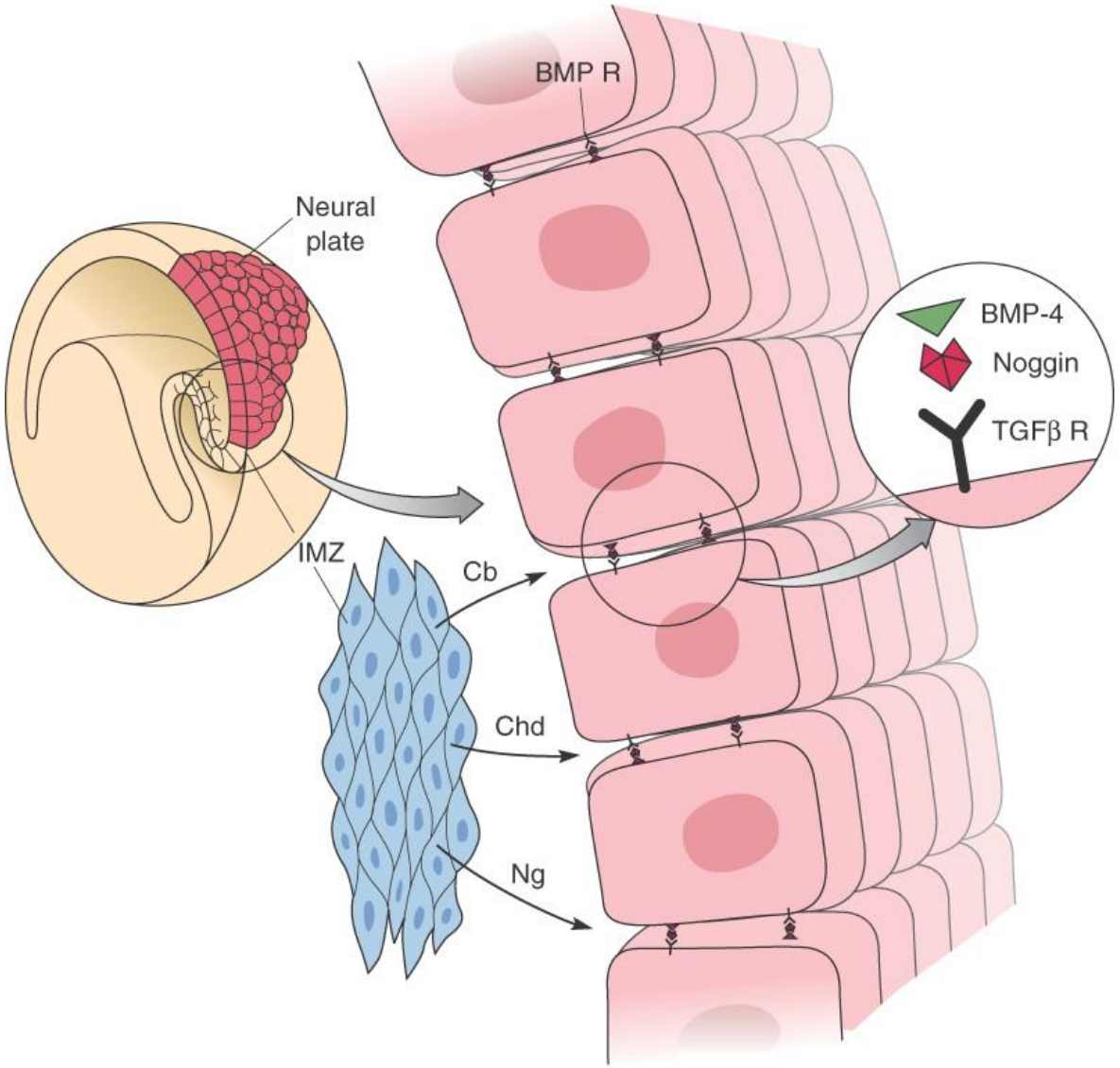
IL SEGNALE DELLE *BONE MORPHOGENETIC PROTEINS* (BMP) SPECIFICA IL DESTINO EPIDERMICO



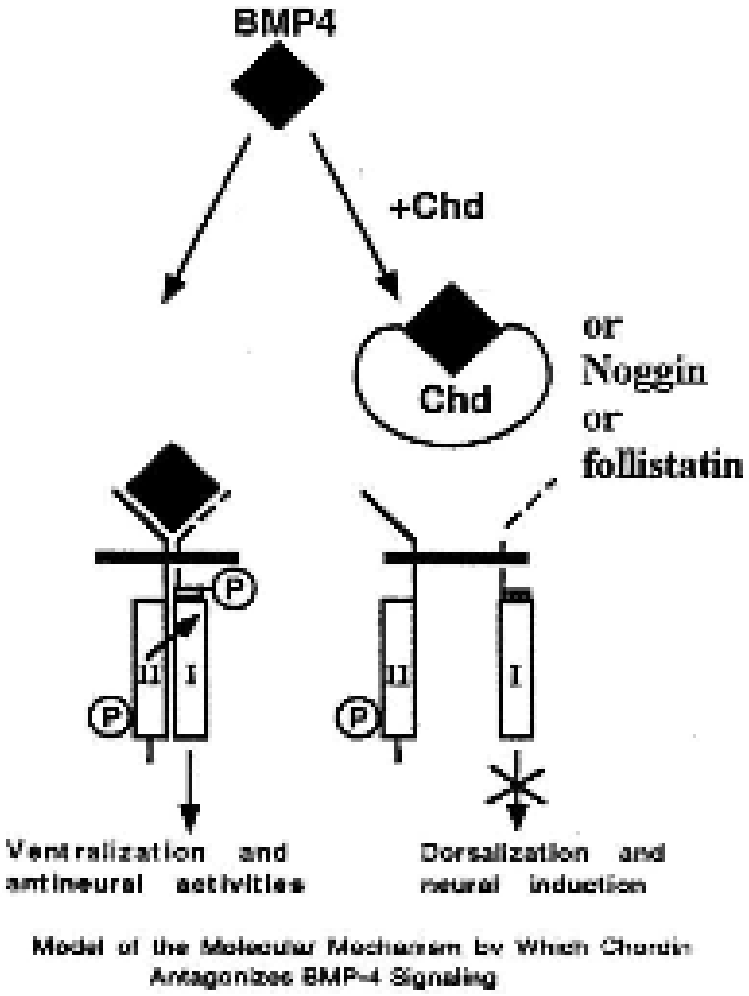
L'INIBIZIONE DEL SEGNALE BMP SPECIFICA IL DESTINO NEURALE



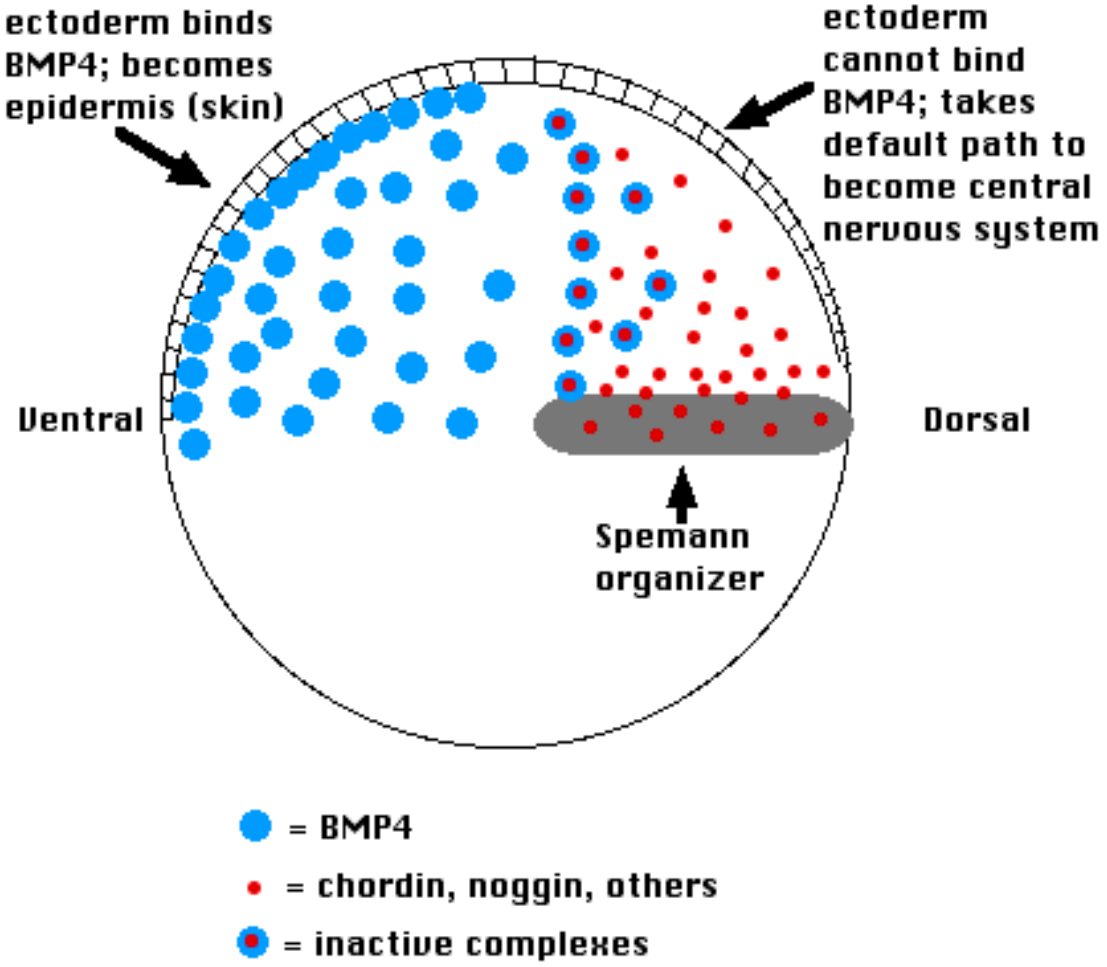
CHORDIN, NOGGIN E FOLLISTATIN AGISCONO COME ANTAGONISTI EXTRA-CELLULARI DEI FATTORI BMP



L'ORGANIZZATORE E' UNA SORGENTE DI ANTAGONISTI DI FATTORI BMP



Model of the Molecular Mechanism by Which Chordin Antagonizes BMP-4 Signaling



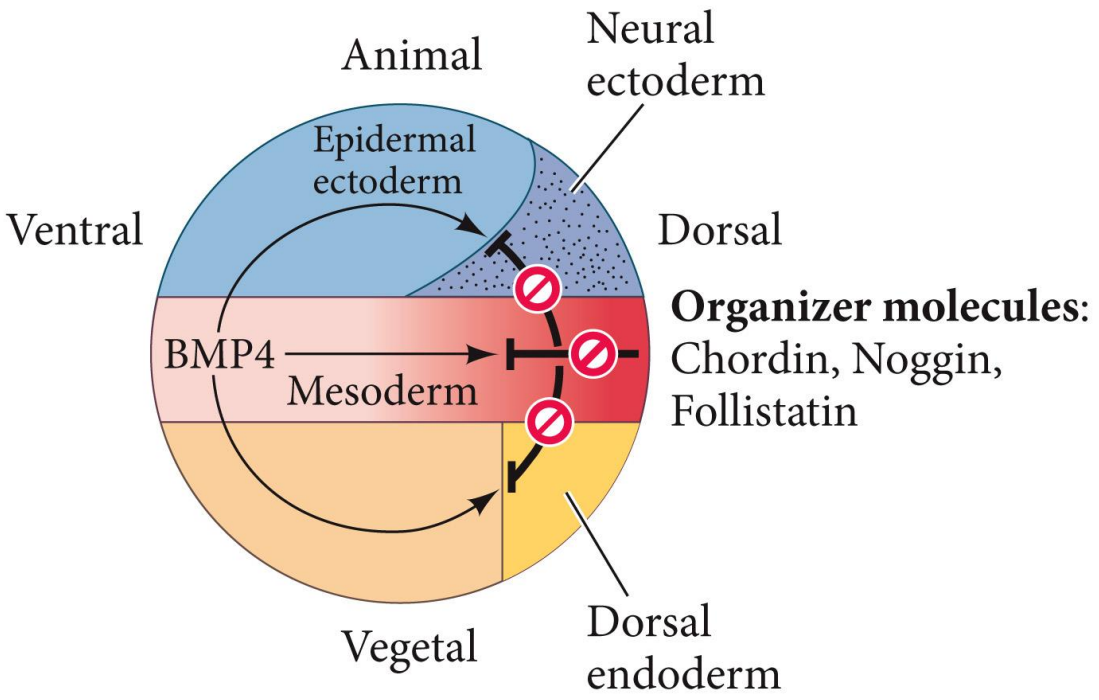
Funzioni dell'organizzatore:

-Capacita' di autodifferenziarsi in mesoderma dorsale (mesoderma precordale, notocorda)

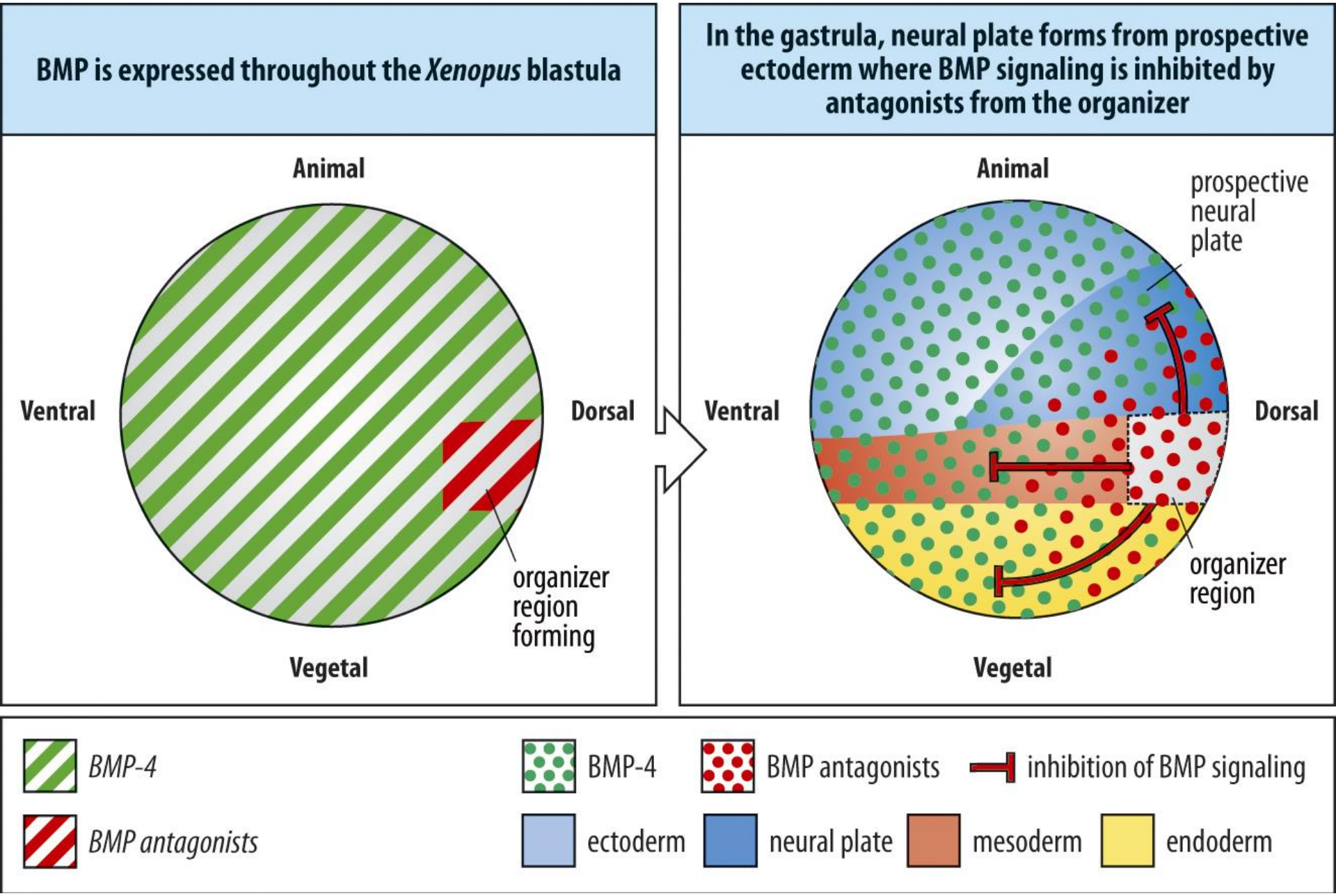
-Induzione neurale (indirizzamento dell'ectoderma dorsale a neuroectoderma invece che epidermide)

-Dorsalizzazione del mesoderma parassiale (indirizzamento a somiti invece che mesoderma ventrale)

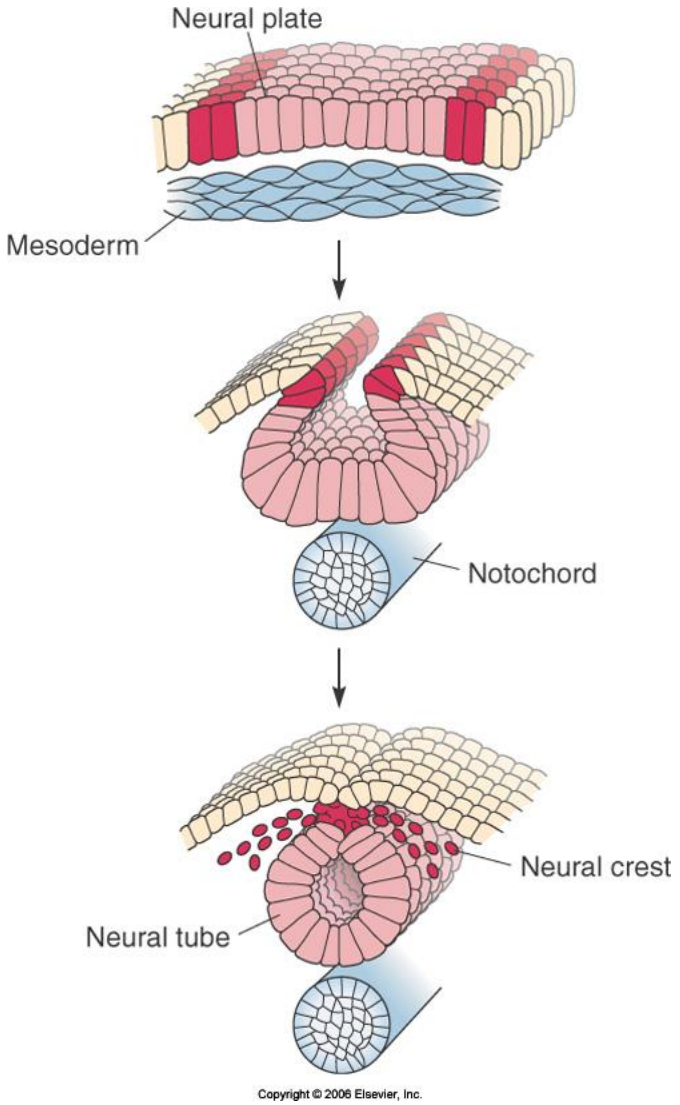
- Attivazione dei movimenti di gastrulazione

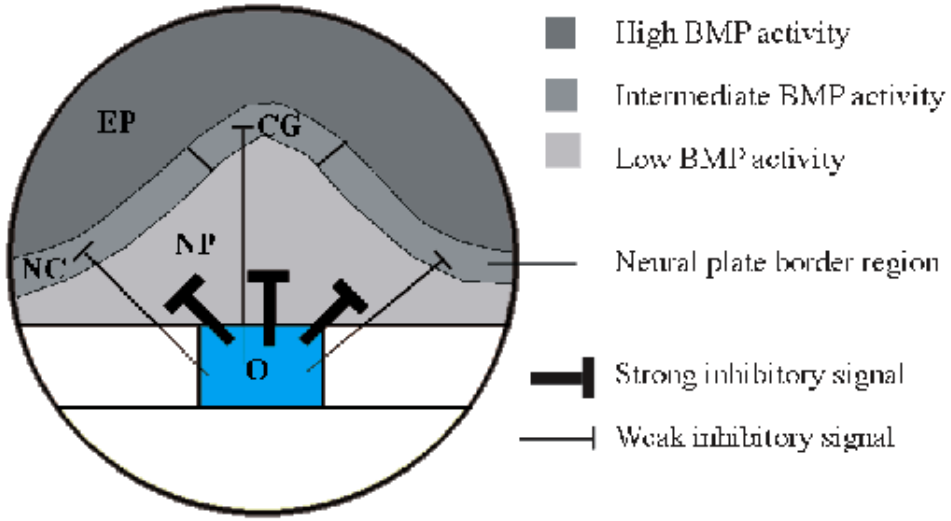


DEVELOPMENTAL BIOLOGY 11e, Figure 11.21

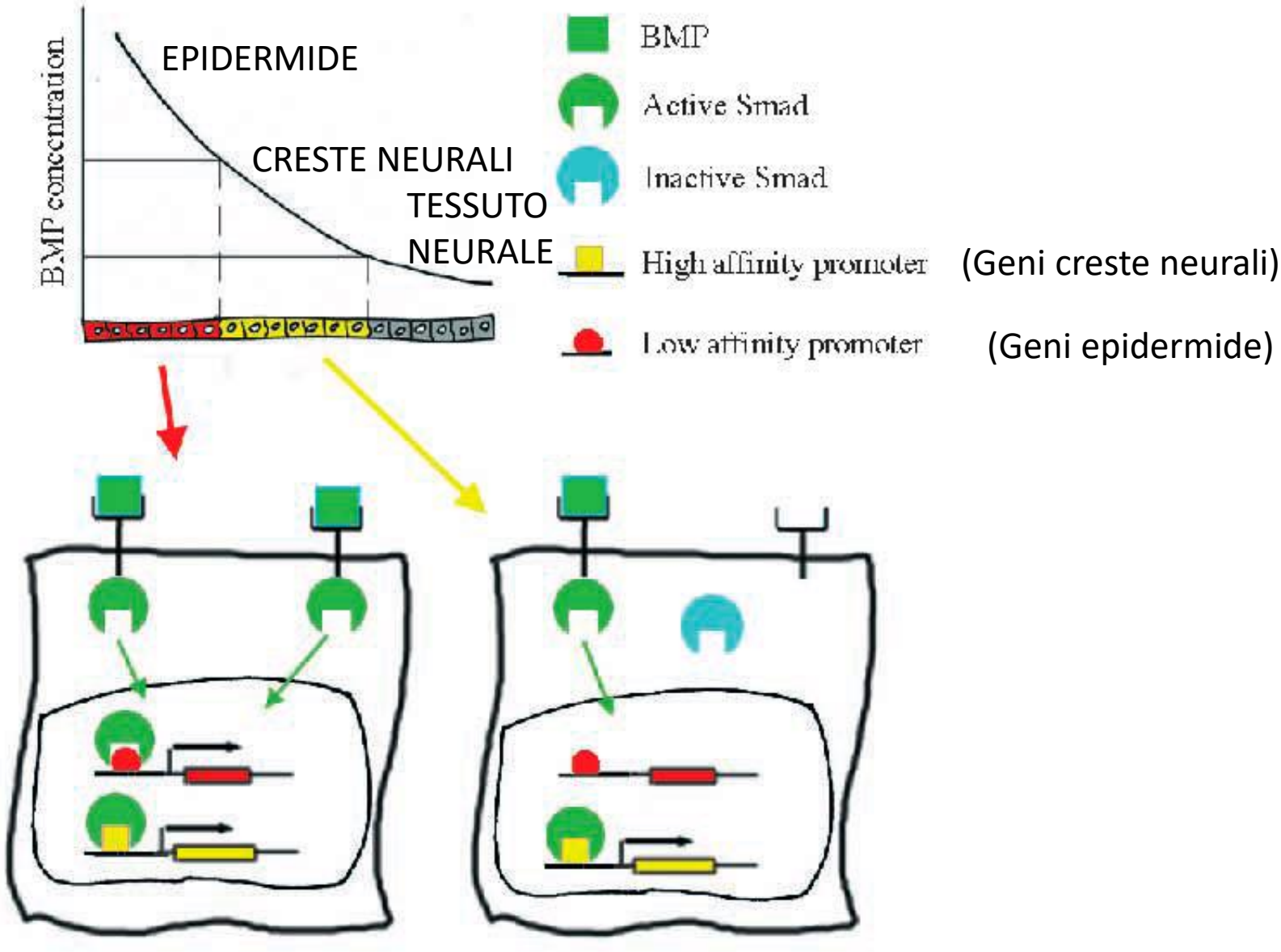

BMP is expressed throughout the *Xenopus* blastula
In the gastrula, neural plate forms from prospective ectoderm where BMP signaling is inhibited by antagonists from the organizer
Animal
Ventral
Dorsal
Vegetal
organizer region forming
prospective neural plate
organizer region
BMP-4
BMP antagonists
BMP-4
BMP antagonists
inhibition of BMP signaling
ectoderm
neural plate
mesoderm
endoderm

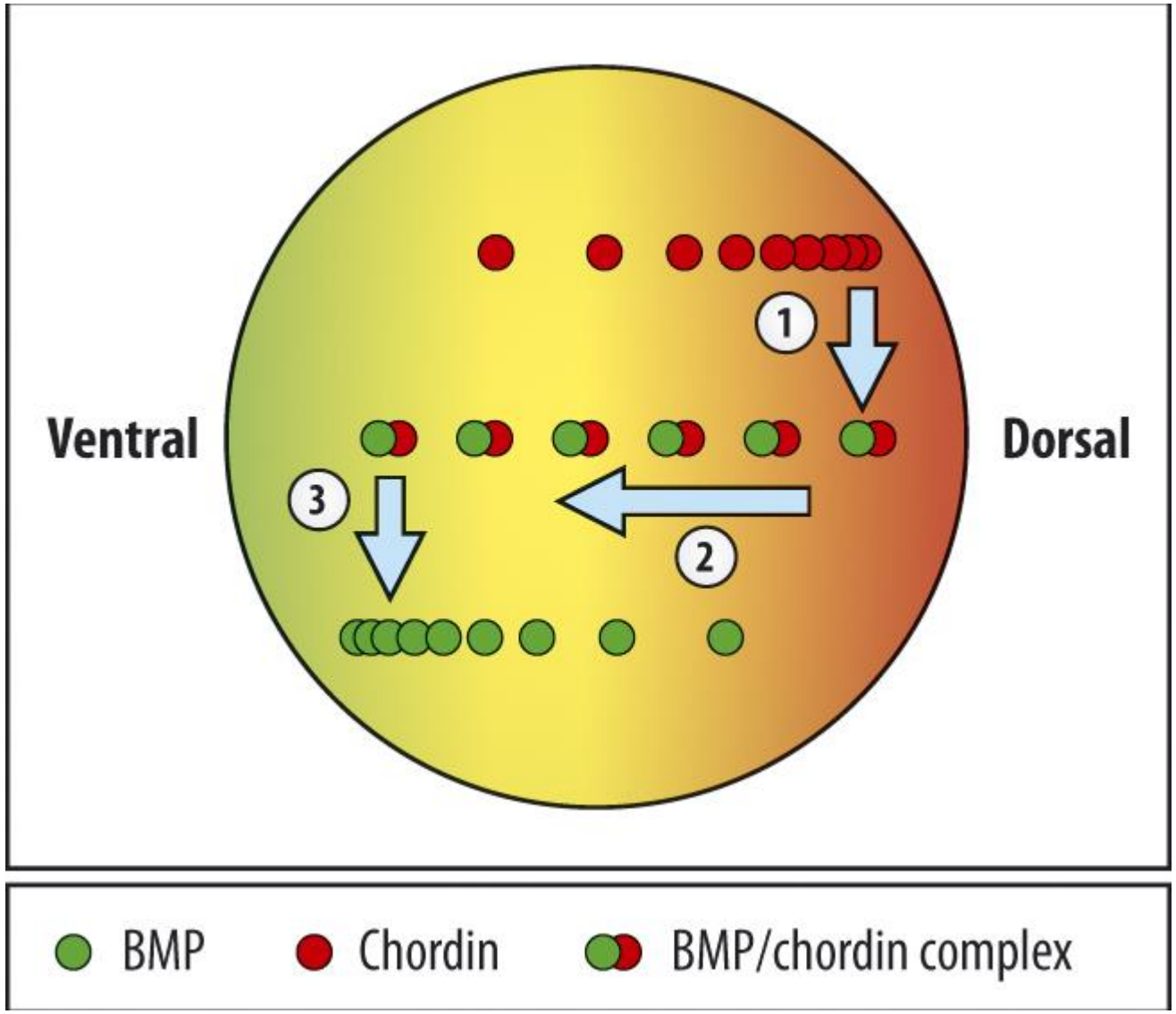
PATTERNING DELL'ECTODERMA MEDIANTE UN GRADIENTE DI SEGNALE BMP





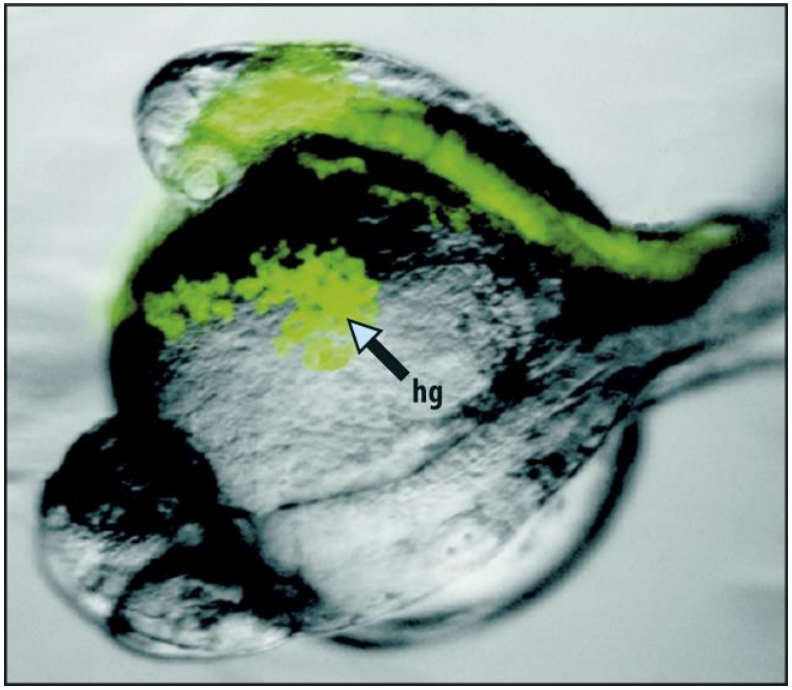
REGIONALIZZAZIONE DELL'ECTODERMA MEDIANTE UN GRADIENTE DI SEGNALAZIONE BMP

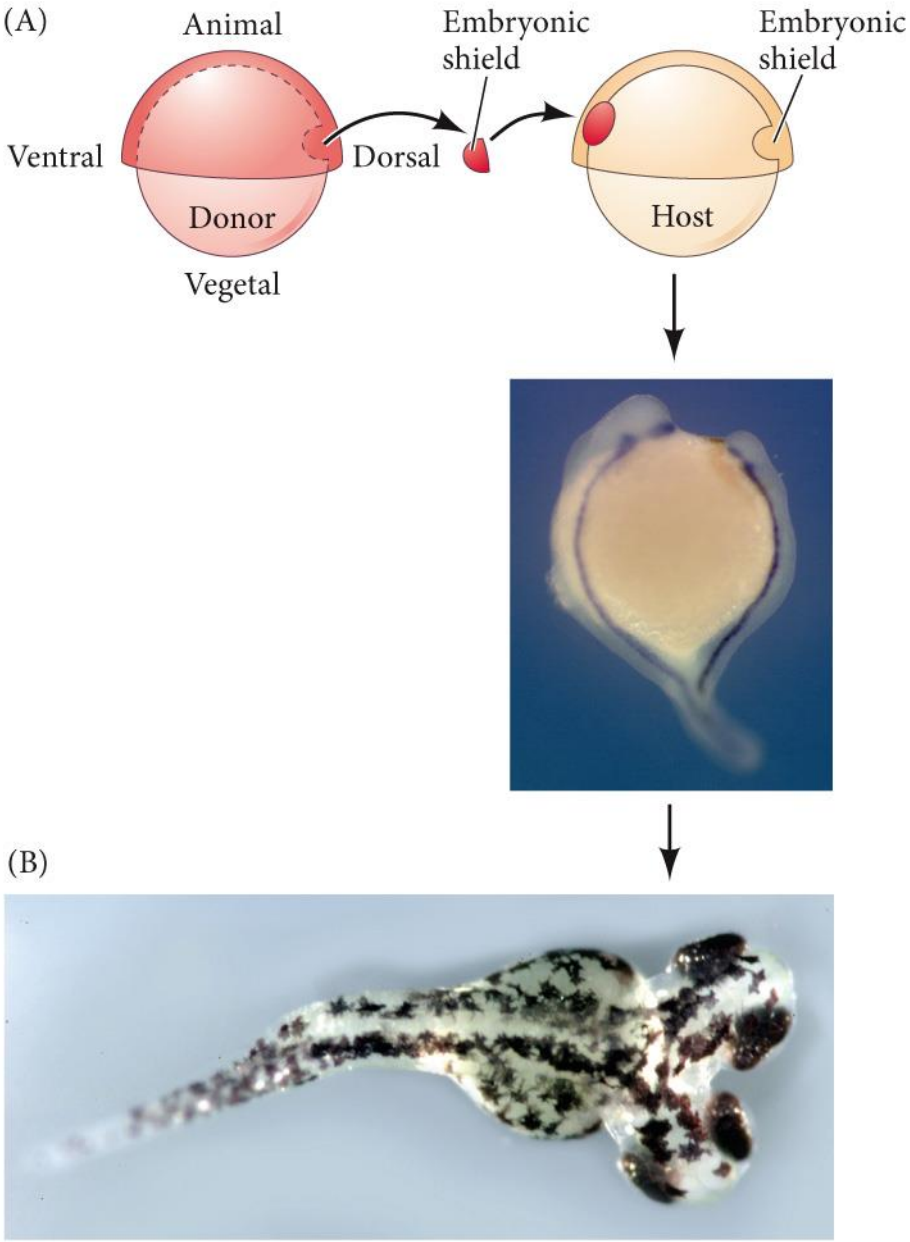




Le proteine Chordin e BMP formano un complesso nella regione dorsale e diffondono nella regione ventrale.
Una metalloproteasi presente nella regione ventrale degrada Chordin e libera i fattori BMP.
Questo meccanismo contribuisce a rifinire il gradiente dorso-ventrale di segnalazione BMP.

L'ORGANIZZATORE E' PRESENTE IN TUTTI I VERTEBRATI ALLO STADIO DI GASTRULA: ZEBRAFISH -> SCUDO

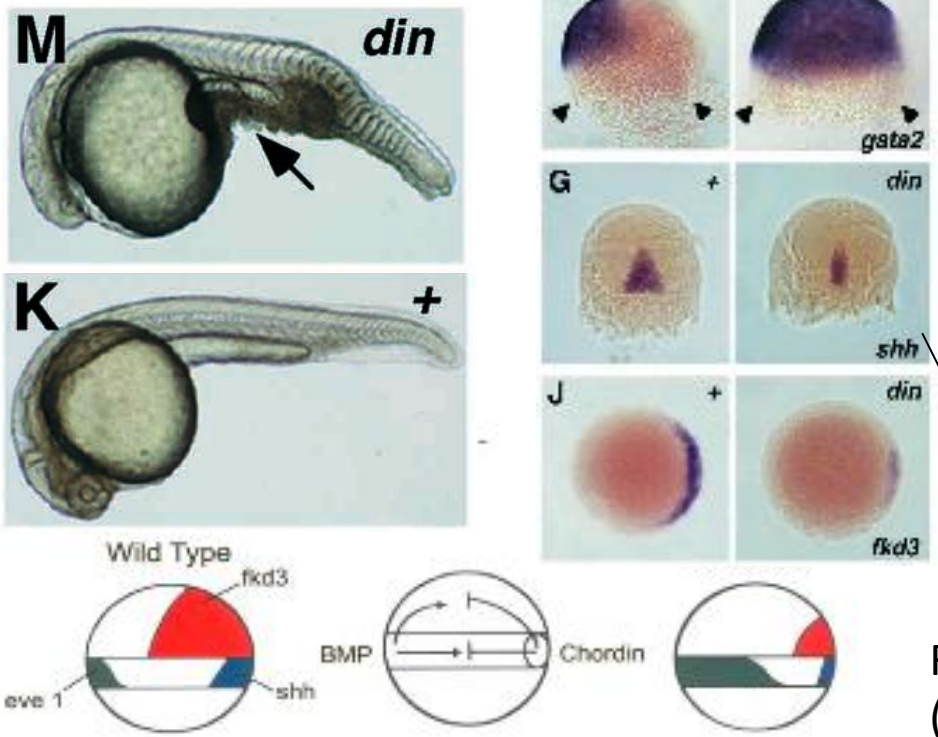


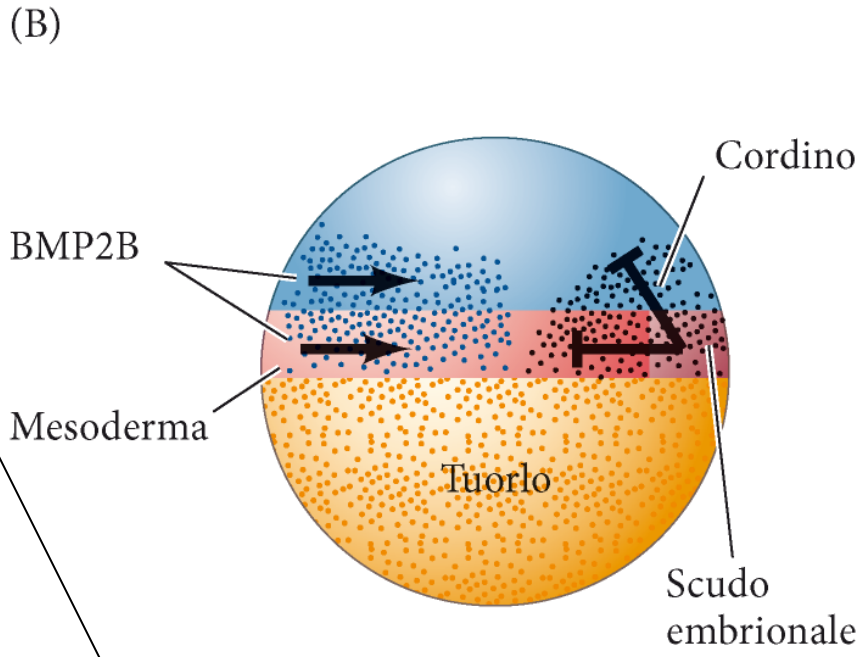


DEVELOPMENTAL BIOLOGY 11e, Figure 11.40

CHORDIN E' NECESSARIO PER LE FUNZIONI DELL'ORGANIZZATORE IN ZEBRAFISH

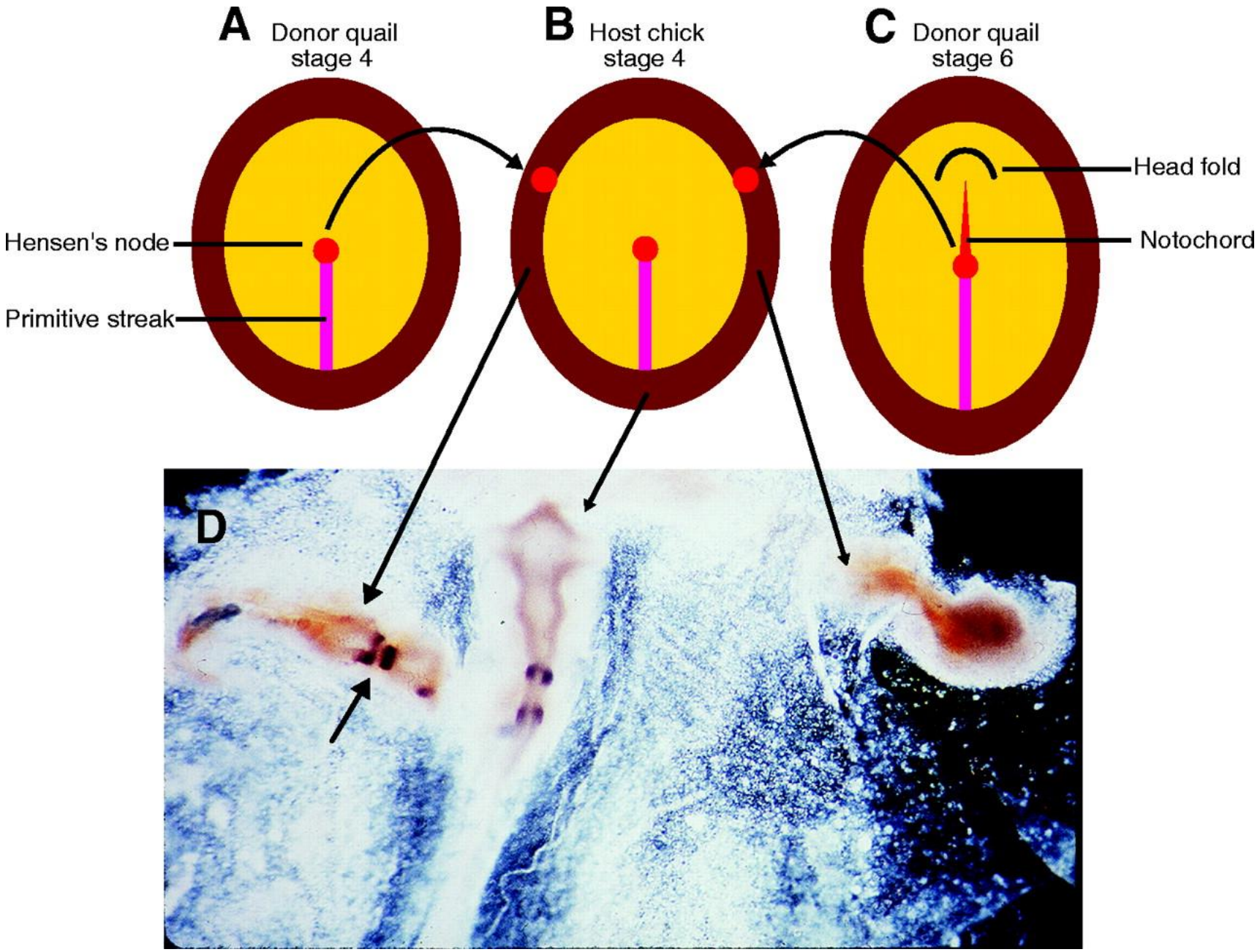
Il mutante per il gene Chordin in zebrafish (linea mutante Cordino) è parzialmente ventralizzato





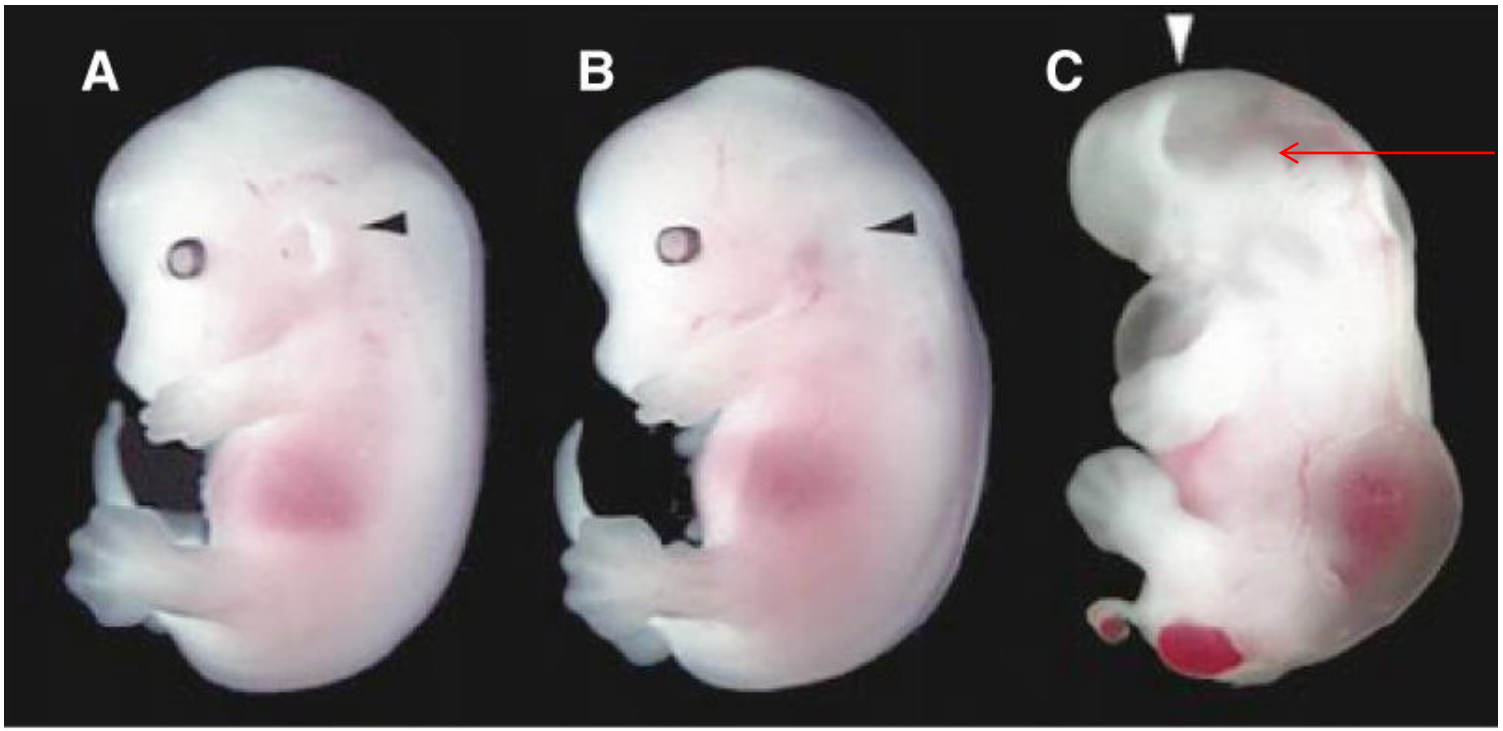
Riduzione del neuroectoderma (marcatore fkd3) ed espansione ventrale dell'ectoderma non neurale (marcatore gata2) negli embrioni mutanti Cordino allo stadio di gastrula

L'ORGANIZZATORE E' PRESENTE IN TUTTI I VERTEBRATI ALLO STADIO DI GASTRULA: AMNIOTI -> NODO



RIDONDANZA FUNZIONALE FRA CHORDIN E NOGGIN NEL TOPO

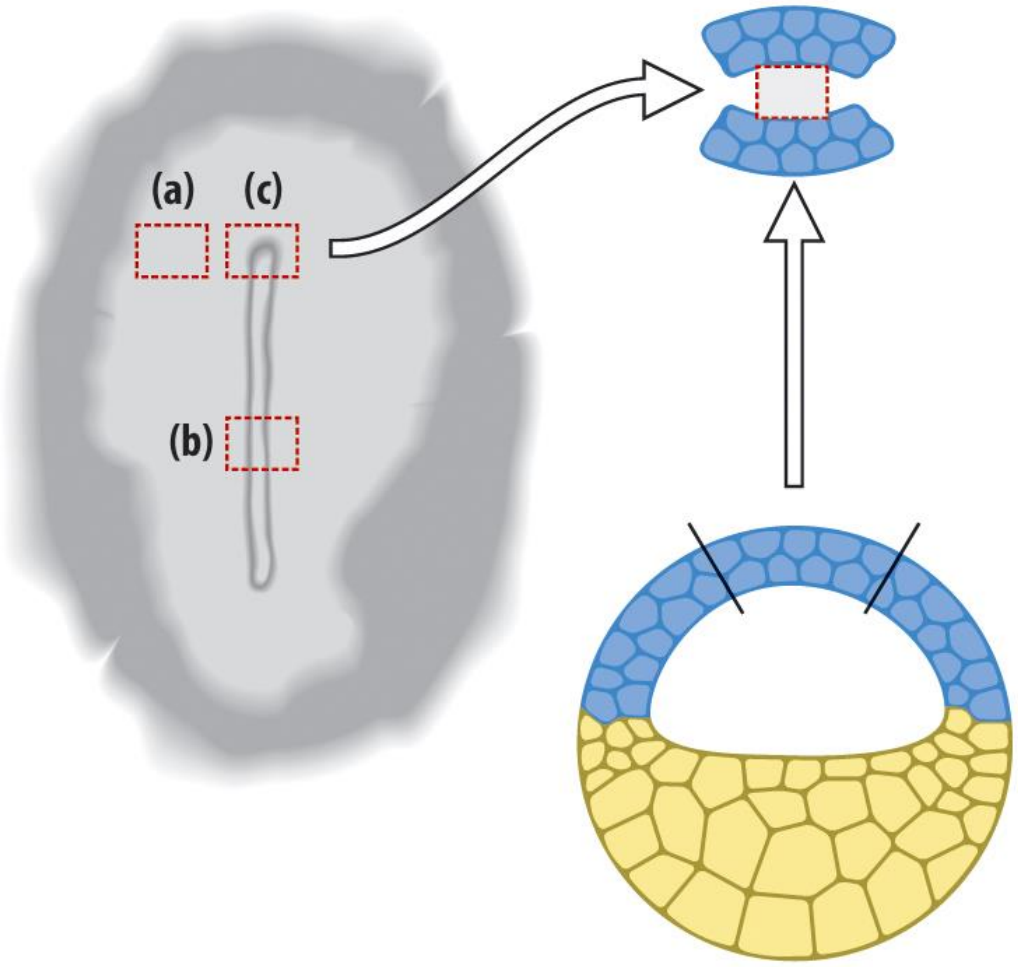
Espressione del gene Chordin nel nodo e suoi derivati (cordomesoderma) nell'embrione di topo allo stadio di gastrula



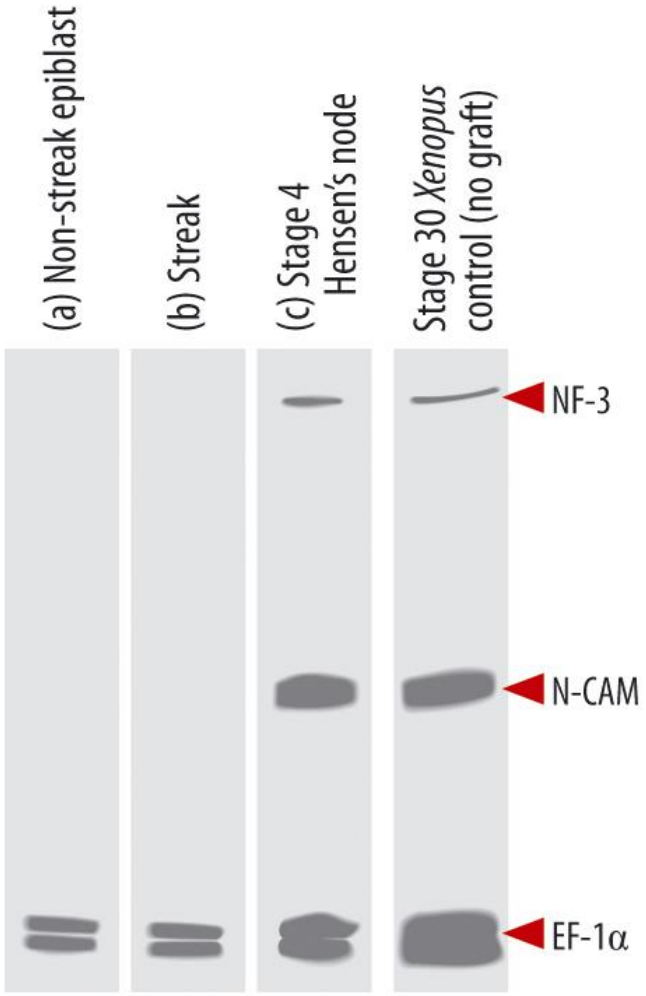
Ridotto sviluppo del tubo neurale negli embrioni con mutazione simultanea nei geni Chordin e Noggin

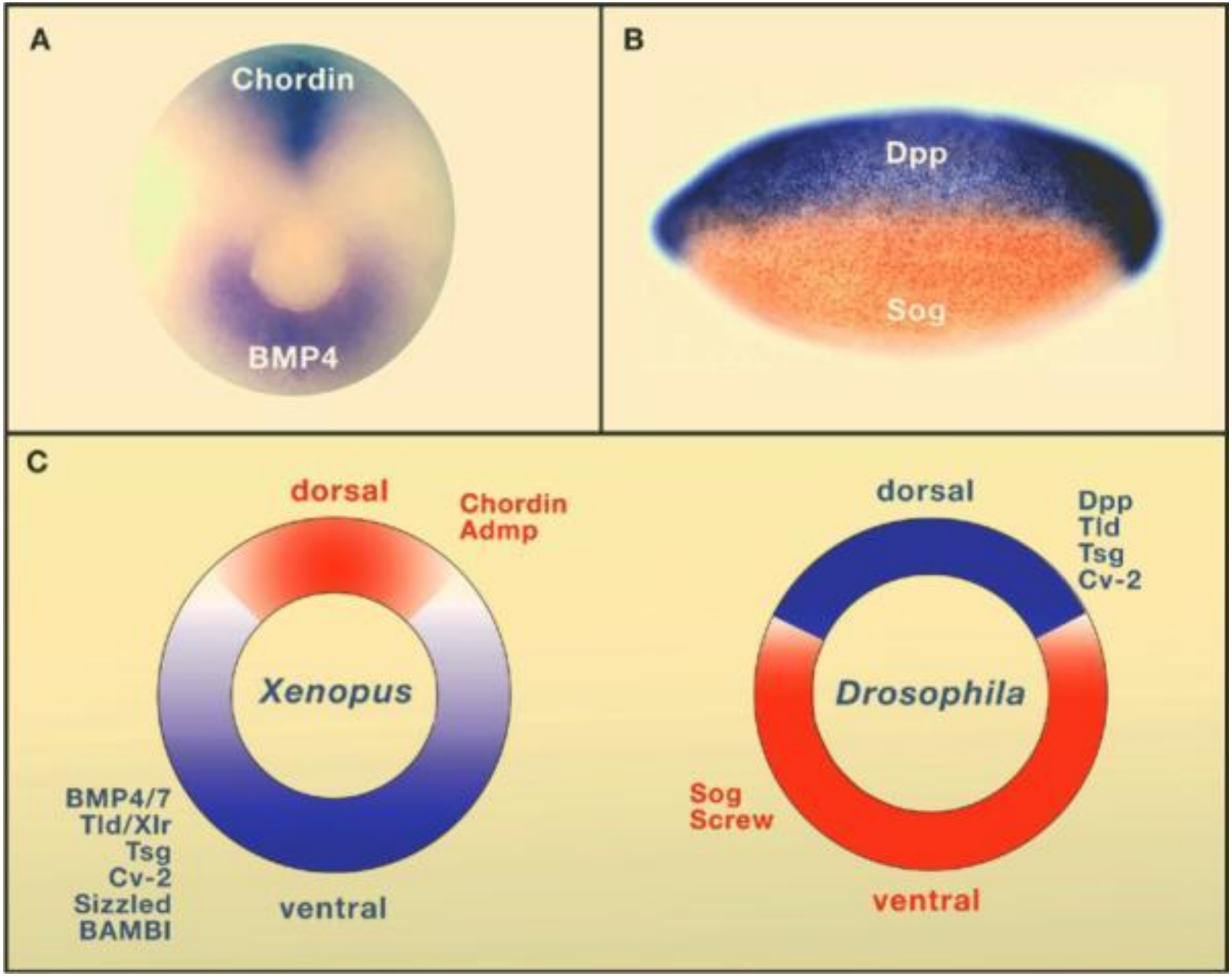
(From Bachiller et al., 2000)

Pieces of chick epiblast are sandwiched between pieces of *Xenopus* animal cap tissue



mRNAs expressed in *Xenopus* ectoderm in response to chick grafts




A
Chordin
BMP4
B
Dpp
Sog
C
dorsal
Chordin
Admp
Xenopus
BMP4/7
Tld/Xlr
Tsg
Cv-2
Sizzled
BAMBI
ventral
dorsal
Dpp
Tld
Tsg
Cv-2
Drosophila
Sog
Screw
ventral

I FATTORI CHORDIN E BMP SONO CONSERVATI NEGLI INVERTEBRATI (corrispondono a sog e dpp in Drosophila)