

Quadrant II – Transcript and Related Material

Programme: Bachelor of Science (Third Year)

Subject: Zoology

Course Code: ZOC 108

Course Title: Developmental biology

Unit: Transplantation, Embryonic induction, Concept of Primary organizer and Competence.

Module Name: Concept of Primary organizer, Experiments by Brachets.

Module No: 20

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Notes

Primary organizer

The organizer is an embryonic tissue which organises the surrounding tissues to develop an embryo. An "organizer" is formally defined as a region, or group of cells in an embryo that can both induce (change the fate) and pattern (generate an organized set of structures) adjacent embryonic cells. The concept was first introduced by Spemann and Mangold. To date, about four such regions have been demonstrated:

1. The primary or Spemann organizer (Hensen's node in amniotes).
2. The notochord
3. The zone of polarizing activity of the limb bud
4. The mid-hindbrain boundary.

The normal development of an embryo is due existence, of the organizer. Example: When additional organizers were transplanted, two embryos were produced.

Properties of organizers

- Organizers are capable of self-differentiation and self –organisation.

- They possess the power to induce changes within and in the surrounding cells.
- They have the ability to induce even after crushing, freezing or killing.
- Induction occurs not only in the tissues of the same or closely related species but also in the tissues of animals belonging to different groups.

Brachets experiment

Brachets first experimented on the amphibian embryo in which the first cleavage furrow passes through the grey crescent. This experiment demonstrated the organising capacity of the grey crescent region of amphibian embryos. The two blastomeres were separated after the first cleavage. Each separated blastomere (left and right) developed into a full embryo. Each separated blastomere contained the grey crescent.

Second experiment

First cleavage does not pass through the grey crescent. The two blastomeres were separated after first cleavage. One blastomere contained the grey crescent and the other did not contain the grey crescent. Blastomeres with the grey crescent area developed into a complete embryo. Blastomeres without the grey crescent region did not undergo differentiation and thus no embryo was formed. Thus Brachets experiment clearly demonstrated the organising capacity of the grey crescent region of Amphibian embryo.

The dorsal lip of the blastopore, is found to have developed from the grey crescent region. The dorsal lip of the blastopore also possesses the organizing capacity of the grey crescent region. A number of embryologists have presented the importance of the material associated with the dorsal lip of the amphibian blastopore through various transplantation experiments.

Due to Lack of immune response to the grafted portion and also the lymph vessels and lymph nodes have not yet developed in these stages, the transplantation or grafting is easy in the gastrula and post gastrula stages. The transplanted tissue is rejected when antigens of the graft travel into the lymph nodes through lymph vessels. A graft between similar species is called an allograft (or homograft).