Embryonic Induction — W. H. 1943.

Describe structure of gastrula.

A new function of arch. roof. Not merely to invaginate, and to differentiate into chorda-mesoderm, but exerts a definite influence on overlying prosp. medullary plate. Sends out stimulus which initiates in the overlying ectod. the differentiation of neural ~~tube~~ plate and tube.

tspl of upper lip. Spemann-Mangold. More than med. pl. was induced. A whole secondary embryo. An well integrated, proportionate whole: Organizer.

How do we know that host tissue reacted? Heteropl. tspl.

Teleost

We shall limit further discussion to med. plate, because problem of origin of wholeness is very difficult to discuss. On the other hand, the med. pl. reaction is relatively clear — and very thoroughly analyzed. ~~A bio-assay, the most old~~

Defin. Induction = contact action of one embr. area on another which produces, or causes, a definite differentiation of an organ, or tissue.

AS. R.S.

What happens if mes. is prevented from making contact?

No med. plate. a) Organizer extirpation b) Isolat. of prosp. ~~ect.~~ med. in vitro.
c) Exogastrulation.

Important implication of these ~~two~~ sets of exp.
~~a) med. pl. requires inductive stimulus; it is indiff.~~

~~Prosp. Med. plate is not a mosaic stone, indifferent requires stimulus.~~
~~Process of determination, by induction~~

~~Vogt charts~~

Certain embryonic areas are not blocked out yet in early gastrula stage. Prosp. Med-pl. is not determined yet, does not contain all factors for ~~neur.~~ neur. diff. within it, requires stimuli from outside, or interaction with other tissue.

Gastrula is not a mosaic of fixed organ primordia.

A whole philosophy of embryol. was overthrown by this and similar experiments. A time honored concept of mosaic development which goes back to 16th + 17th Century Preformistic idea. Egg highly organized.

Organs come gradually into being by interactions of parts of embryo — Epigenetic concept.

Methodological: Analytical embryology vs. descriptive.

Back to mud. pl. If prosp. mud. pl. is undetermined in early Gastrula it should be possible to change its fate at will. Embr. Exp. Spemann.

Mesod. organs. potency Plasticity, reactivity, competence to react to different stimuli.

What is the nature of this embryonic induction?

Tied up with living mes. tissue.?

Killed mesoderm will do. Fungl. method.

Many other tissues contain a medullary inducing agent. living and dead. Even tissues which do not contain it alive. release it

Chem.: Sterols,
thymonucleic acids
protein residues.
dijitonin
inert silica.

part of story: these substances cause breakdown in adjacent cells, thus release substances.

Grave source of errors: The only bio-assay: prosp. epid. contains inductive substance.

At any rate: Mediator is chemical, not tied up with living substance

One substance?

Embr. Induction is widespread – Amph. + other Vertebr.

Other inductors:

Optic cup → lens. Again: no mosaic stone: lens area.

again chemical mediation,
~~no one eye~~ The eye has no monopoly. Similarly active
Substances widespread.

Int. for gut → nose
Hyomand. arch
Int. neuraltube → balancer
hindbrain → ear.

Spemann's theory of chain of induction reactions
gives a good picture of gradual progression in
organization; probably correct for normal development,
but it should not imply as many definite, localized
substances, elaborated by only one organ each.

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1) med. inducing agent is rather universally present
lens inducing –

2) balancer, nose inductions – Holtfr. + Mangolds exp. on
very wide spread.

3) Yamada. Dragomiroff.

It seems ~~rather~~ that a given differentiation is not the result of
one definite substance produced exclusively at a given time
in one special organ.

Rather -- the result of a combination of factors or agents, some
of which are replaceable by others, or can be substituted
~~for~~ by others, or can be missing altogether.