Boveri Festschr. f. Kupffer — ASCARIS MEGALOCEPHALA (BIVALENS.) First cleavage is normal; in the second cleavages, and five successive ones, one of the mitoses is normal, the other, giving rise to the somatic components is diminutory:

The ends of the long chromosomes break off from the middle region. This fragments into 60-70 small chromosomes. The imbedam pieces degenerate. A specific cytoplasmic material preventing diminution may occur, as indicated by centrifugation; 2 cells non-diminute.

Hoegue Arch Entwm 29, 1910 — In diminution mitosis, the spindle fibres are locally at the center.

Boveri Arch Entwm 30, 1910 — In polyspermics, 4 cells form at once, 2 non-diminute.

Krug & Bresse ZEZ 77 (1938) — Same conclusion, in fact: Lecithin distributed substance. Similar process in many nematodes

Kahle Zoologica 21 1908 — MIASTOR [Diptera]. First 2 cleavages, 1 passes to one [illegible] pole of the egg. At that pole; there are many granules, the cell then gains the germ cell. (mitochondria?)

Acc. Kahle the telophase nuclear wall cuts them long chromosomes, extended half disintegrating. Repeated in 4th division. After metaphase, about whole chromosomes lost. The chromosome number in the somatic cells is 12, in germ 24= 48. There is actually a reduplicated chromosome set.

Kreczkiewicz Folia Morph 6
Huettner Anat Rec 60 1934
Pietberger Chromosoma 1 1940 (Oligarics)

Morgan & Bridges Carnegie 278 — Drosophila A series of gynandromorphs. Non-disjunction. Assumed that the germ originate from a single cell. No migration until after 7th cleavage; random

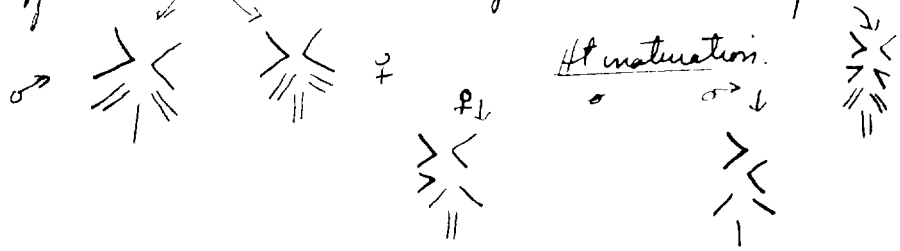
Huettner J Morph 37 1923 migration. The polar nuclei varies from >5<11.
Schleip Quarterly J Morph 67 1941 But the gonads are mixed.
In embryology only a few polar cells include granular material; these yield germ cells.
No elimination in Drosophila

Türkin Zool Jahrb Anat 135 (12) In Entomostraca (Daphnia ...)
Groups of five cells in gonads; others are sacrificed to the one that develops. The nurse cell nuclei are pycnotic That mass lies at random. The cleavage furrows after the 3rd division include the nuclear mass (a Keimbalenkörper; Paraskopulationskörper); cells containing this are the germ cells.

du Bois Z. Zellf 19 (1933) In Sciara:
all fertilized eggs have 12 chromosomes:

1st five cleavages are normal.
In some eggs the cells > are extruded

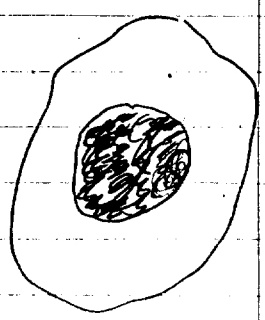
In the 6th through 8th divisions, further elimination
Differences
The germ cells lose only one >, 1

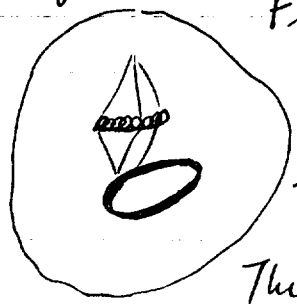


1/13/42 three presumed cases of germ cell determination:

Bierbaum Zool Jahrb (Anat) 30 1910

Dytiscus (water beetle, cytologically difficult) In ♀ in the last oogonial division, the germ nucleus differentiates one side becoming slightly pycnotic. The chromosomes come from the typical portion. The rest of the nucleus forms a ring. The ring is Feulgen positive. This occurs in 4 divisions, the ring segregating to 1 cell of 16. This forms the oocyte egg cell; the others are nurse cells





This is not a germ determination as such.

Seiler, Arch Zellf 13 (1915)

Cooper, KW Chromosoma 1 (1939) Arachnida

LEPIDOPTERA: Lymantria, Ephestia In maturation division. As metaphase tetrads appear and separate, some material was found between the chromosomes.

Stuff disappears

In Pediculopsis, this is found in both meiosis, and the early cleavages of the zygote. Feulgen negative.

Summary:

1. True determination, may be extra chromosomal
   - A. Polar plasm
   - B. Nurse nuclei or adjacent cytoplasm
   - C. Elimination; diminution
2. Pseudo
   - A. Bytiscus
   - B. Lepidoptera

Fertilization

Controversy —

Must involve several consequent processes, but the essential task and purpose is syngamy, nuclear.

Large variation in phase of development of the fertilizable egg.

In Dinophilus (a rotifer like annual) the sperm enters egg before meiosis begins

Ascaris - just before the first prophase. as the sperm nucleus becomes diffuse, the egg matures.

In Coelenterata, Echinodermata, eggs are generally mature.

In annelids, Arenicola the meiosis has begun at the time of fertilization.

In Echinoderm eggs, fertilization may occur prematurely under experimental conditions. The sperm will not enter

until the germinal vesicle has broken down; thereafter even the isolated cortex can be "fertilized."

Just Biol Bull 44 1923 If the cortex is removed (bolting cloth) completely no sperm will enter.

Violent currents in egg in relation to the sperm entrance. Fertilization cone; egg swallows sperm.

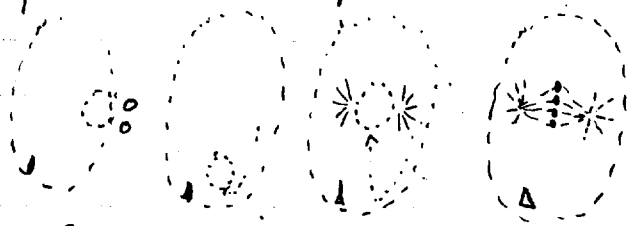
Path of pronuclei to "equilibrium" The ♂ may migrate directly to the ♀ pronucleus.

In some large eggs, the first path is rectilinear; Then an orientation in respect to nucleus, the copulation path

see pp 82 et seq →

1/15/43 Partial Fertilization – gynogenesis No action of nucleus. May occur "accidentally" in nature (hybrid crosses, etc)

Bělař Z. Zellf 1 (1924) Rhabditis (nematode?) after 2 pb are given off the sperm enters at one pole, normally movements are as:



Under relatively anoxic conditions, the chromosomes organize as usual, but the ♀ pronucleus does not migrate. In the neighborhood of the sperm an amphiaster forms. If dyad is readmitted the egg nucleus migrates and "picks up"

the amphiaster.

Packard Biol Bull 36 1918 Radium inactivated eggs, nuclei destroyed. The sperm alone will start with first cleavages up to blastulae

minimal life history activation of egg without the participation of sperm.

There may be a limited division before cleavage.

Artificial Parthenogenesis

Hypertonic sea water → multipolar asters

Fertilization membrane not well separated

by double treatment, butyric - s.w. cytolysis checked by latter

2 steps in fertilization cortical cytolysis + its check. Best work has shown hypertonic seawater is adequate if properly adjusted.

Herlant Arch Exp Zool 57 (1918) had actually proposed that each component of the double treatment gave rise to 1 aster. !!

by Amphibia -

Guyer Science 1925 Puncture egg with fine needle dipped in blood. Balanced leucocytes acting!

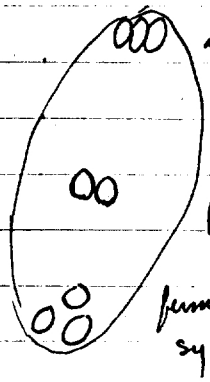
Bataillon CRAS 150 1910 In Toad eggs, only sterile puncture is required

Loeb J. Gen Phys 3 1921 In Rana, only needle is required

Parmentier J Exp Zool ca 1938-40 Various embryos. Only restored diploids survive. Mosaics. Both sexes!!! How explain?

Plant karyology

Progressive reduction of haploid phase. In maize only 8 nuclei in the female gametophyte.



The male gametophyte has 2 haploid gam nuclei. In double fertilization, triploid endosperm and diploid zygotes are formed with consequent modification of Mendelism.

Early work on fertilization directed at centrioles.
Rabl '87 – Fusion or syngamy of centres!!! Not sustained

"probably no definite rule of the centriole origin"
The sperm brings in the centre, usually.

In egg fragments division will occur
In partial fertilization" only centriole participates
In polyspermy, numerous spindles.
In some cases, egg provides its own centrioles, as Gigrodactylus, Fascicle of the trematodes.
Conklin Biol Bull 7 1904 Study of (parthenogenetic) cupidula. Conservation of genetic continuity.

Wilson p445 ff In Nereis The middle piece is left out. But this may have an elongate centriole, rod theory, the nucleus.

FIN DE LIVRE

4-13-43. C.L. Huskins on Chromosome Coiling.

Trillium first demonstrated ~~xxx~~

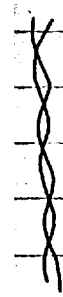
In Trillium there is spiralization in both divisions.

Relational coil shown.

At somewhat elevated temperatures, the spirals seem to iron out.

Reasons for difficulty:

1. Spiralization was first deductive; Darlington "has been completely disproven."
2. Variations in appearance: technique
   organisms, stage, size, chromosome.
3. Number of strands in a chromosome.
4. Visibility
5. Optical artefact; psychological factors, particularly at limit of visibility
6. 3 dimensional visualization difficult for many people. Stupidity



see e.g. AJB '40

A: The relational coil: a twisted skein wire in 2 spirals in the same direction. Right-hand spiral is right handed from any aspect.

Doubling of coil and bipartite coil are the same

B. Direction of coil cannot be determined from photos. (MJD white)

Chromomeres vs. Spirals.

Strand Number: Howard & Delaunois hold 8 strands. My own spiral fairly clear but may be really only the two sister strands. !!!!

If a spiral is coiled with ends fixed

But ends do not slip apart.

If ends rotate, the spiral can fall apart.

by Tradescantia: a clear minor spiral → major in 2nd division

by Trillium, the major persists; matrix contracts.

" the matrix does not contract, chromonema elongates

Darlington proposes molecular spiral.

Huskins holds that in last premeiotic mitoses the relational coil is formed. Gene reproduction occurs during a coil stage. Pulling out causes deviation for entwisting relational spiral is produced.