

Bones derived from optic capsules
generally none.

Optic capsules give rise to sclera
(sclerotic coat) of the eye
In birds there is a ^{thin} ring of bone
formed from the optic capsule
around the eye.

Olfactory Capsules

Lateral ethmoidals } same position &
Turbinated bones } fused with

ethmoidal because
of fusion descended process
Turbinated anterior to lateral and
to ethmoidal

Visceral Skeleton

Gill arch I.

17. Palatoquadrate or Pterygoquadrate
only one constant cart. bone
derived from Palato. The quadrate
bone - is the only constant cartilage
bone from the

One upper jaw does not come from the
Palatoquadrate

Human -

Quadrato in human becomes the
bone in middle ear. leans it
posterior to go to tympanic
membrane

Malleus - hammer

~~Incus - anvil~~

~~Stapes - stirrup~~

~~Quadrato from the incus~~

~~Our upper jaw comes from~~

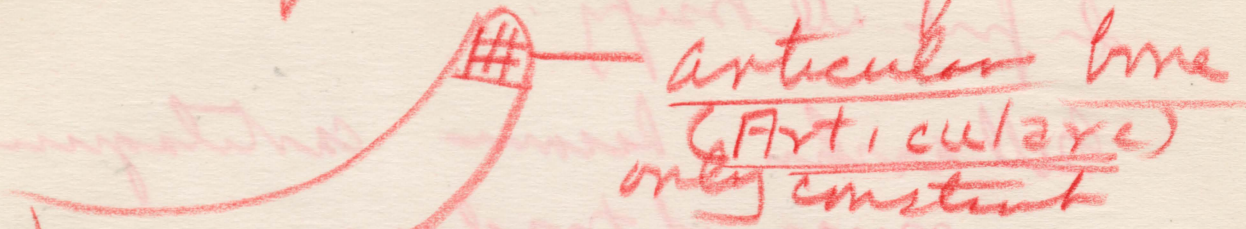
Maxillary skeleton

all and I.

A.

Quadrato quadrato -
only one constant
derived from. Delt. the quadrato
bone - is the only constant
from for the
Our upper jaw has the same
Delt. quadrato

In human - Pelate - membrane
Meckel's Cartilage has similar fate -

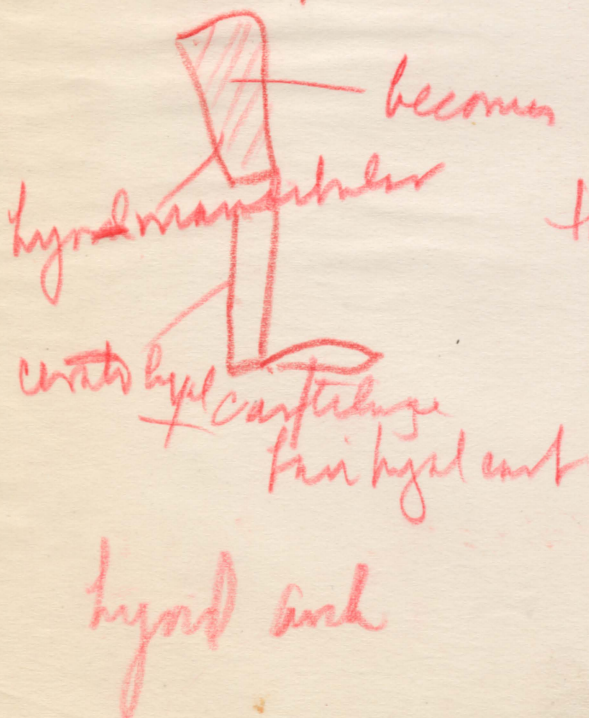


Cartilage bone
derived from Meckel's Cartilage

In human fetus -

Articulare goes into the tympanic
cavity to form the malleus
(hammer)

Cartilage Bone for skull arch II
only to one -



becomes ossified in many + helps in
the articulation of the lower
jaw.

And certain long vertebrate
In other it rises + forms
the struts

Periosteal layer -

do not all ossify

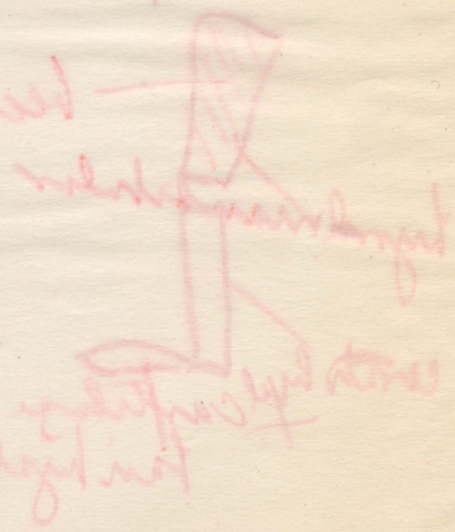
Cell matrix becomes cartilaginous
rings of trachea

Review for Friday

Cartilage Bone for skull
only to one -

become ossified in many + help in
the construction of the bones

As cartilage harden
on other in case of bone



Cartilage

Questions -

- 1- Basis used by Aristotle and fallacy thereof -
- 2- Modern Criteria as compared to that used by Aristotle.
- 3- What was John Ray's Contribution?
- 4- Is there such a thing as straight line evolution? Discuss.
- 5- Who was the real founder of Taxonomy and what were his contributions.
- 6- Name the associations organized for the purpose of standardizing the naming of animals. What provisions did they agree upon?
- 7- Key to Phylum Annelida 6-
Key to Classes of Annelida 2
Key to Order of Annelida 2
- 8- Justify the diphyletic tree.

April 3, 1940

First 5 are not distinctive
the following

~~Metameric arrangement of muscles~~

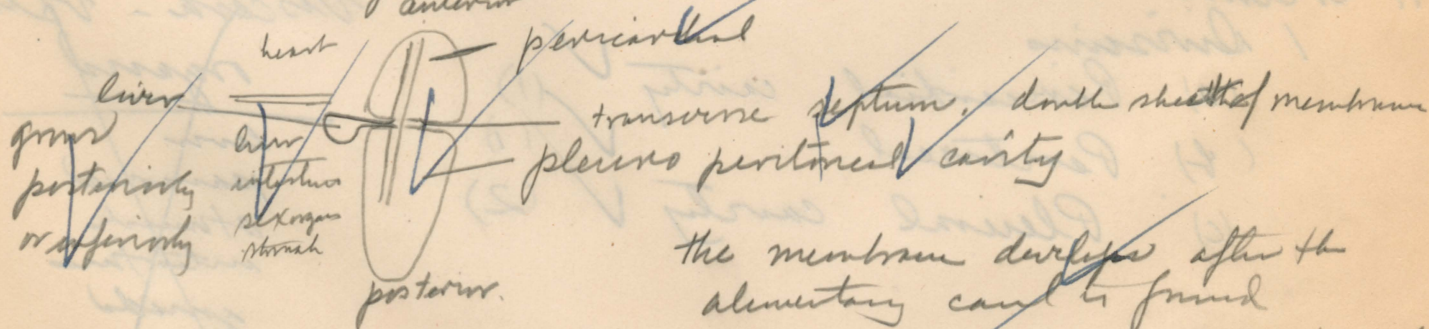
1. Evidence of Segments
 - a - Axial skeleton (vertebrae)
 - b - Peripheral nervous system
 - c - 1st true - metameric arrange muscles
2. Skin separate & its outgrowths - constitutes the eposkeleton.

teeth - ep. d.	nails, spines
hair - ep.	claws, hoofs
scales of dog fish - ep, d.	crests, horns,
scales of reptile - ep.	feathers
" of trout - d.	

3. Coelom (body cavity)

divided into two or four compartments

A - 2 compartment - dog fish
asymmetric sketch of horizontal section

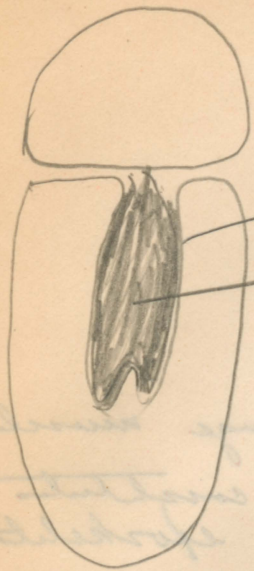


the membrane develops after the alimentary canal is formed

liver is out pouching of the alimentary tract



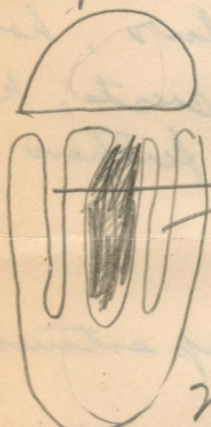
Aliment canal as straight tube -
of man



serosa of the liver is membrane
 (visceral peritoneum) ✓
 ↓
 This covering is so closely attached
 to considered a part of the liver

Attached
 it

Justification of calling pleuro peritoneal. & because



lungs

pleuro is in reference to large
 pleural cavity is cut up into
 which the lungs fit.

mud pupper & dog fish

A Coelom —

1 Division

- (a) Pericardial cavity ✓ (1)
- (b) Peritoneal ✓ (1)
- (c) Pleural cavity ✓ (2)

Viscera - vital

- organs
- liver
- pancreas
- stomach
- intestines
- gonads
- heart
- lungs

Kidney sac not pushed out into the coelom & kidney etc
 are also both of the coelom

What are the parts of the body of any mollusc?
head, foot, visceral mass, mantle, and the shell. gills?

Classes of Molluscs

Amphineura - Chitons
Gastropoda - Abalone Snails
? Schaphoda
Cephalopoda - Squids - Octopus
Polygyrta - Bivalves

How can gastropoda be distinguished from others by "Asymmetrical" i.e. not bilateral

Know about Squids - Cephalopods

The largest animal in invertebrates is the Giant Squid, 55ft - caught. (Have good eyes)

Octopus - 28ft overall

Chambered Nautilus - River Wendel Holmes.

Walled off by septa, connected by tissue

What is a mantle? Mantle is body wall possibly to protect gill. Pearls formed by mantle in the mantle.

Structure of heart.

Why^{now} is water pulled thru the whole clam?
How are the siphons formed? By modification of the mantle.

What is Bicus? organ of attachment

Water for respiration? Into water tube thru the ostia, dorsally to the chambers

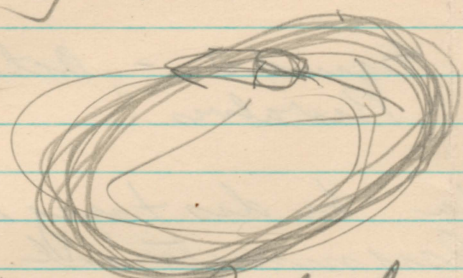
Arteries

Bilateral Nasally - No segmentation
Many

peristalsis - proximal layer muscular layer

Distal layer muscular layer Food is mostly digested & partially absorbed

heart
lungs
kidneys



Present of Medicine as Product

- A. England
- B. Germany
- C. United States

Present Practices of Medicine
Medicine is European

Method of Medicine

Possible Future of Medicine

Case for Compulsory Health Insurance

A. ~~Plan~~

Method Arthur
Thomas Kobayashi
Suggs

Introduce ~~Product~~

The Need for Compulsory Medicine
Economic Reasons
Social Reasons

Introduction
A. History

Any irregularity has reason ✓

Every ear has different origin ✓

5/8/40

1st ear is inner ear ✓

2nd middle ear = Tympanic cavity +

Eustachian tube - part of pharyngeal pouch (Alimentary canal) (ear drum space cavity)

3rd

1 ear

2 ears

3 ears

hammer
anvil
stirrup

2 ears

3 ears

separate origins

Parts of ear

hammer anvil + ear drum

cochlea

Membranous labyrinth - inner ear

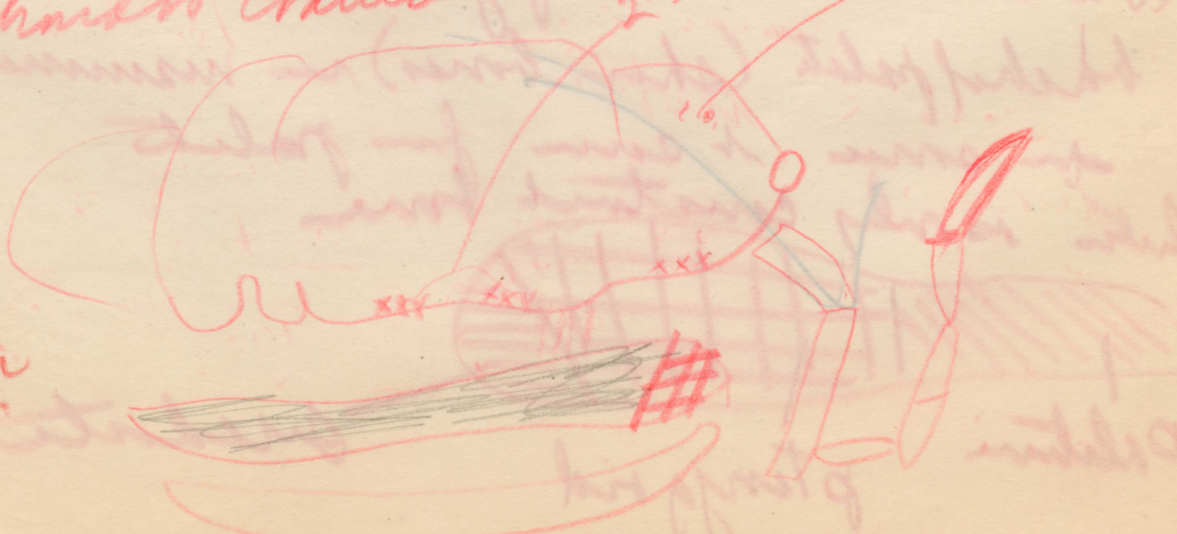
→ bony labyrinth

Chorda crurium

2 horns of sphenoid bone

inner ear

Human



Otic capsule - from casing bones of ear
temporal bone -

a - Cartilage bone

A petrous ^{envelopes} ~~inner ear~~

B mastoid. ~~membrana~~

C - Skin Bones (Cranial Bones)

A Squamosa

articulates with the
malar or cheekbone
to form temporal arch

~~Zygomatic Bulla~~

2 Zygomatic processes

Squamosa has 2 zygomatic process
(yoked processes)

Petrous is inside - ~~inner ear~~

B Tympanic Bulla

houses middle ear

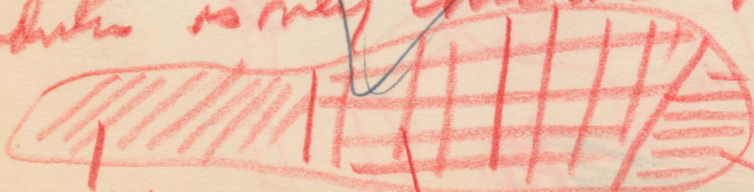
may be as many as 3 bones

Palatines Pterygoids Quadrate

back of palate (skin bones) in mammals

in some 1 can form palate

but quadrate is only cranial bone



Palatine

pterygoid

quadrate

Hyoid - tongue attachment.

intrinsic muscles - within

extrinsic muscle - outside moves tongue
muscle attached to hyoid.

Gill arches -

I - Mandibular

a. Palatoquadrate or Pterygoquadrate cartilages
(dorsal half) constitutes upper jaw.

b. Meckel's cartilages (embryologist)

constitutes lower jaw.

Whole arch contributes to formation of ~~gill~~ skull.

II Hyoid - consists of 3 parts. (paired) cartilages

(a) Basihyal

(b) Ceratohyal

(c) Hypohyal

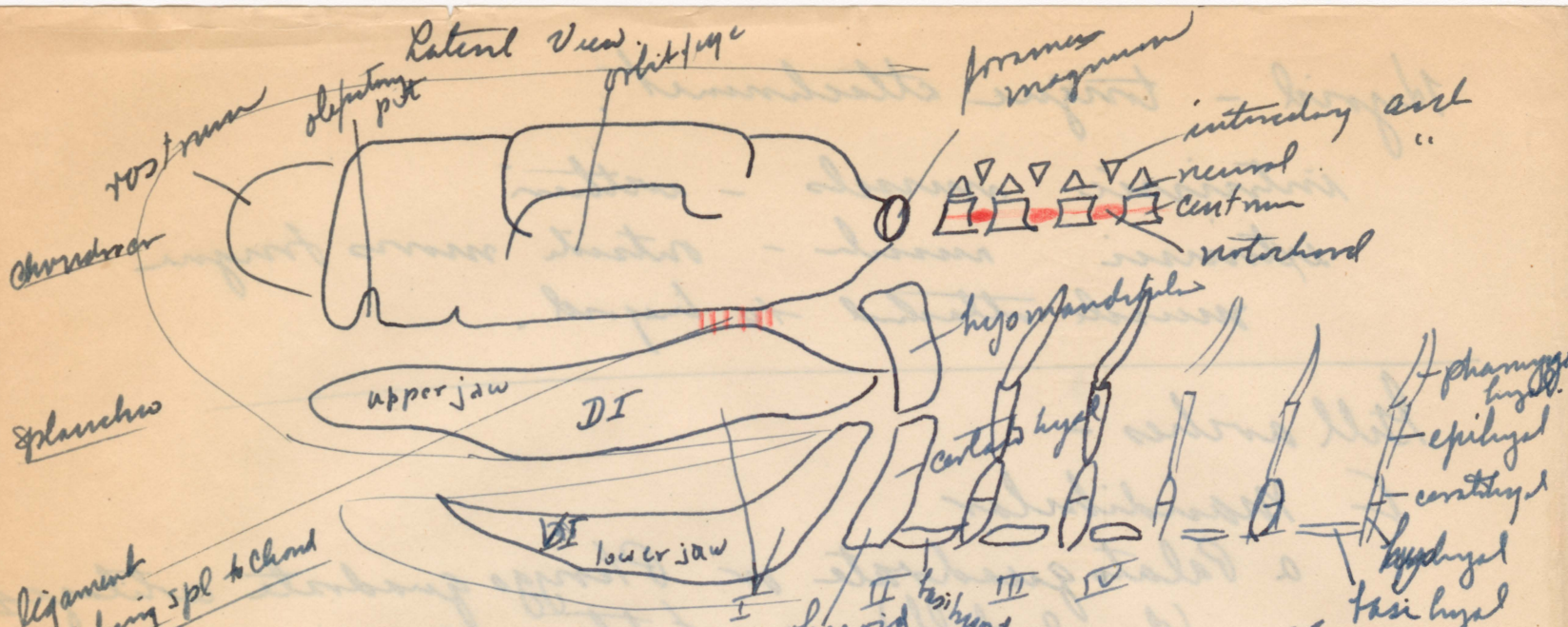
dorsal half of same II.

Contributes to skull formation.

Adams appl. - cartilage ~~to~~ rings
on 1 rodica. larynx etc = other
gill arches

This constitutes along fish skull.





Branchial basket is formed by the gill arches & connective ventral.
 1st gill arch modified to form jaws.

Chondro more highly developed than skull

Anterior fontanelle
 epiphyseal foramen (gland of intracranial secretion)

Splanchnocranium consists of paired cartilages in between the walls of the gill slits

Gill arch skeleton (vertebral skeleton)
 Direction of gill arch - to operate gills
 2 fold purg - keep gills open + move gills
 muscles must attach to some support.

Number of gill arches 7 pair generally (8 in some elasmobranch fishes)
 Typical gill arch has following parts
 basihyal, basihyal, hyo-hyal, ceratohyal, epihyal
 pharyngo-hyal or (hyal = branchial)

Cartilage bone derived from the sense capsules

Cartilage bone derived from sense capsules

A. Otic Capsules

may be 5 bones as in fishes

1. pro-otic

2. epiotic

3. opisthotic

4. pterotic

5. sphenotic

② petromastoid in human days etc

(a) petrous (rock)

(b) mastoid part

surrounds inner ear

Cartilage bones of Otic capsule

which is part of temporal bone

Temporal bone most interesting bone in skull.

forms the side of skull - borders on floor of skull

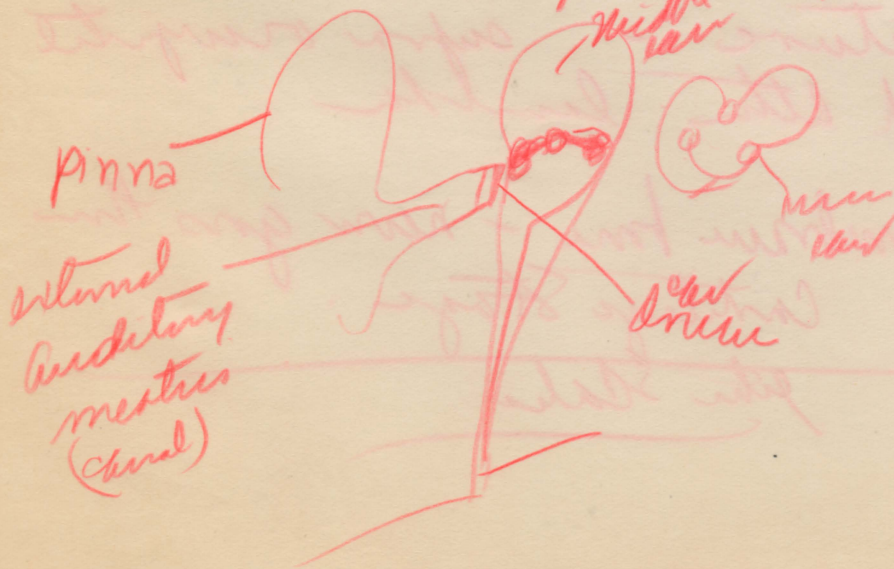
petrous bone is inside & forms around the inner ear. (surrounds)

(c) Tympanic bulla

(d) Squamous part

dermal bones

Most complex bone of the body



3 ears

independent sources

Skull -

1. Def.

2. Parts of embryonic skull

a. chondrocranium - cart brain case

b. splanchnocranium - visc

(Just gill arches 1 & part of 2)

3. Dogfish Adult skull.

differs in that it serves as a skull & chondrocranium remain permanently in the cartilage state

Review development again Stage Imp.

Transformation of chondrocranium into bone

I. Cartilage bones derived from para & prechordal cartilages.

A. Occipital Group of bones

bone forming cells transform cartilage to bone

1. base occipital ①

2. exoccipital ②

3. supraoccipital ③

4 centers of condensation
each having an occipital condyle and a trigular process articulation with atlas to hold head on

Process of ossification: Run & beam

12 pairs cranial nerves in vertebrate - 10 in dogfish
Cranium merely takes the contour of the brain & nerves

Exoccipital ^{2 openings} has the ~~12th~~ ^{foramen} for the exit of the 12th cranial nerve oculus gyri

Bound the foramen magnum

Occipital group comes from the parachordal & synaptic cartilages

Cart Bones from Prechordals

B Post-sphenoid. This is a cartilage bone
Maded 3 bones

Posterior part of (prechordal cartilage) give rise to
It attaches perpendicular to the occipital

- (a) basi sphenoid ①
- (b) alisphenoid ② (alar) (Alae) (wings)

2 pairs of large openings on each side =

base bone
into sphenoid

- ① foramen ovale
- ② " rotunda exit of cranial nerves

B Anterior sphenoid group
From prechordal cartilages

(3 bones)

- (a) presphenoid ①
- (b) orbito sphenoid ② 1 pr optic foramina
for exit of optic nerve

pre

between alisphenoid & orbito sphenoid there
is a very large opening (orbital fissure)
transmits several ^{cranial} nerves (more than any other)

D Ethmoid Group

- mesethmoid ①
- ect ethmoid ②

pre

Pre + Post for

(3)

Transformation of these cartilage to bone

Mammalia Skull - (log)

All vertebral chondrosarcom only consist of
sphenoid body + basal plate + ethmoid. (inter-
walls).

What bones are developed from basal plate + ethmoid plate

Bone forming groups from the prechordal
& parachordal cartilages.

Parachordal cartilages.

A. Occipital group.

Faint, illegible handwriting, possibly bleed-through from the reverse side of the page.

Pris crinis
pencil

Apip
Skull -

Visceral Skeleton (part of the particeps in formation of skull)

Ribs

Vertebral column

Appendicular.

Pelvic appendages

Stemum (

Pectoral appendages

Skull - endoskeleton of head.

A Def

B. Division:

Cranium

It ~~is~~ protects sense organs

C. Origin

Mesenchyme - migrates into head & cond.,
to form chondrocranium

Def of mesenchyme - mixed origin

D consists of

1. Chondrocranium cartilaginous cranium.

2. 2 Splanchnocranium. (parts of only) enters
into skull formation (visceral skeleton
because it protects vital organs).

Every vertebrate has these 2 stages

In dog fish only it remains as chondrocranium & splanchnocranium.

Others is ~~not~~ changed to bone. We

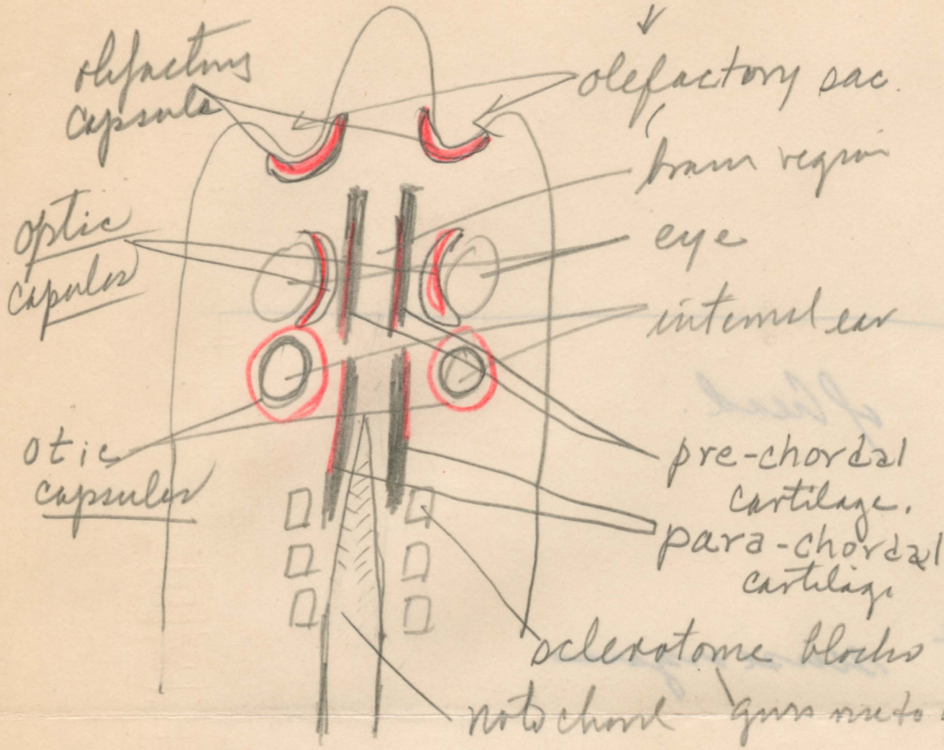
all that is chondro & splanchn

②
 Basis cursum of basal plate region —

Brain is formed first.

Basal support is more necessary than top —

Frontal section (white saggital?)
 above mouth



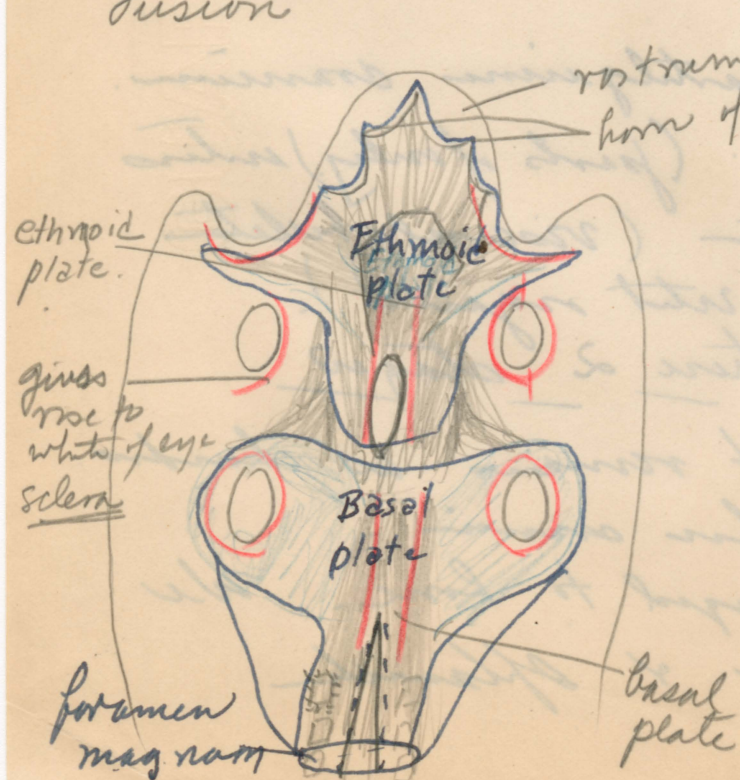
(dorsal view)

Any resemblance to persons

Posterior mesenchyme migrate into head and condense to 5 pairs of cartilage

1. olfactory caps
2. optic "
3. otic "
4. prechordal cart.
5. para-chordal "

Fusion



Fusion of paired cartilages

1. anterior end of prechordals fuse to form the ethmoid plate.
2. Ethmoid plate fuses laterally with the nasal capsules
3. Ethmoid plate (prechordals) project forward into the rostrum as the horns of trabeculae

- ③ The parachordals fuse to form the basal plate and incorporate in fusion the anterior end of the notochord and paired sclerotomes
- ④ The basal plate fuses laterally with the optic capsules
- ⑤ Basal plate + posterior end of prechordals fuse together

Note: Optic capsules do not fuse so that motion of eye is possible

In human cart goes to form bone.

- this mesenchyme gives rise to sclerotic coat or white of the eye in dogfish or human being

This constitutes the ~~basal part of brain support~~ floor for the brain

In most vertebrates, the chondrocranium consists mainly of basal region + synaptic tectum.

In dogfish this chondrocranium goes up to form lateral wall and ^{basal plate} dorsally from the synaptic tectum. + goes to form the roof (upward dorsal extension)

In human + all others this is transformed into bone

Human Skull -

4/22/40

Skin sluffing due to lack of food.

Frogs moult skin

Humans moult all the time.

Birds moult products of epidermis

Epidermis → 2 layers.

Dermis -

Cells are more loosely arranged.

give rise to cell fibers which are products of the cells,

thick layer derived from dermatome

"hide" - thick mass - determines size with skin

~~hide~~ in strict sense is just the dermis
- tanned.

Bloodvessels in dermis

always at some parallel with each other
in dermis.

Only can where epidermis has bloodvessels
is tail of gills covers.

Vascular system

A Blood Vascular { Heart
Arteries
Veins
capillaries

B Lymph Vascular =

Accessory systems Blood vascular.

consist of lymph nodes, glands,
vessels, "hearts" in some animals;

Function: where blood system does not
go, lymph goes with food & O₂.

Lymph & nodes are in dermis

End organs of sense are in dermis

In some Vertebrates (other than man) ^{hair} ~~hairs~~ are found in epidermis

Teeth

are integumental products.

Homology Between Teeth & Scales.

"Homologous organs are alike in embryonic origin."

Teeth are modified scales - { Epidermis & dermis

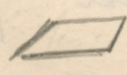
A Scales -

1- kinds:

a Placoid scale
dogfish

} both epidermis & dermis

b) Ctenoid scale (lake trout - toothlike)
trout, perch

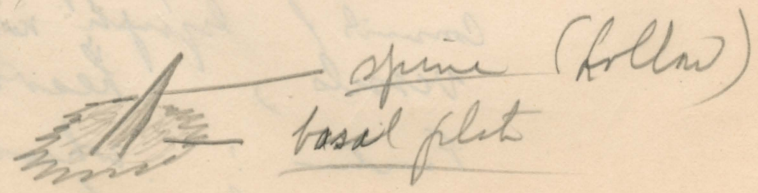
c. Rhomboid 
garpike

d Cycloid.
Amia (fish) "bowfin"
freshwater dogfish

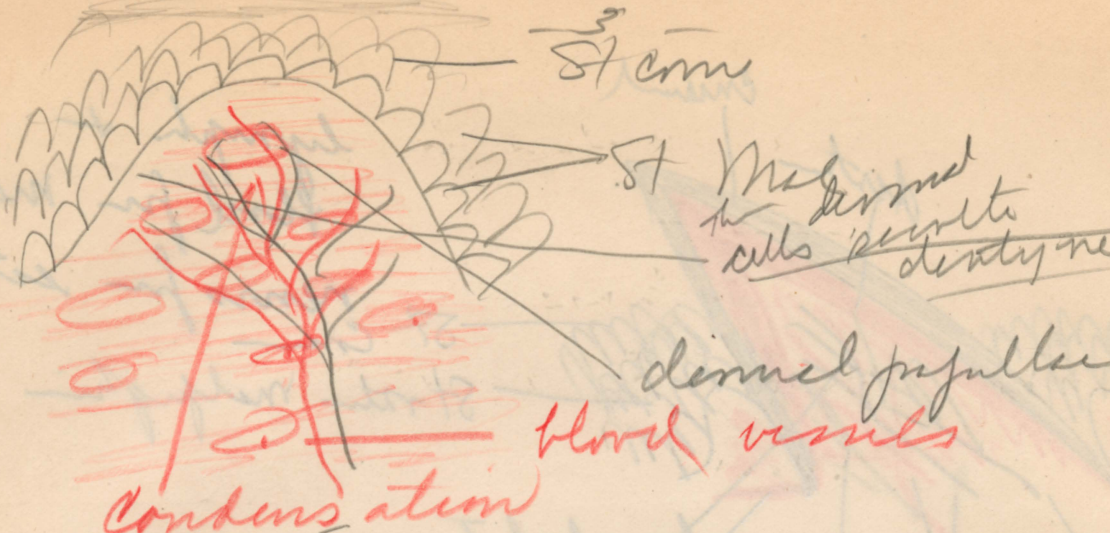
} dermis only
in products

Placoid type of scale -

dogfish
dogfish scale



section



Condensation of dentin to form a papilla

Fig 1

Scale starts as a condensation in the dentin & pushes down the epidermis



3 hard parts in body -
enamel
dentine
cement

Note

- Change of shape in papilla
- Secretion of dentin
- Thinning of papilla

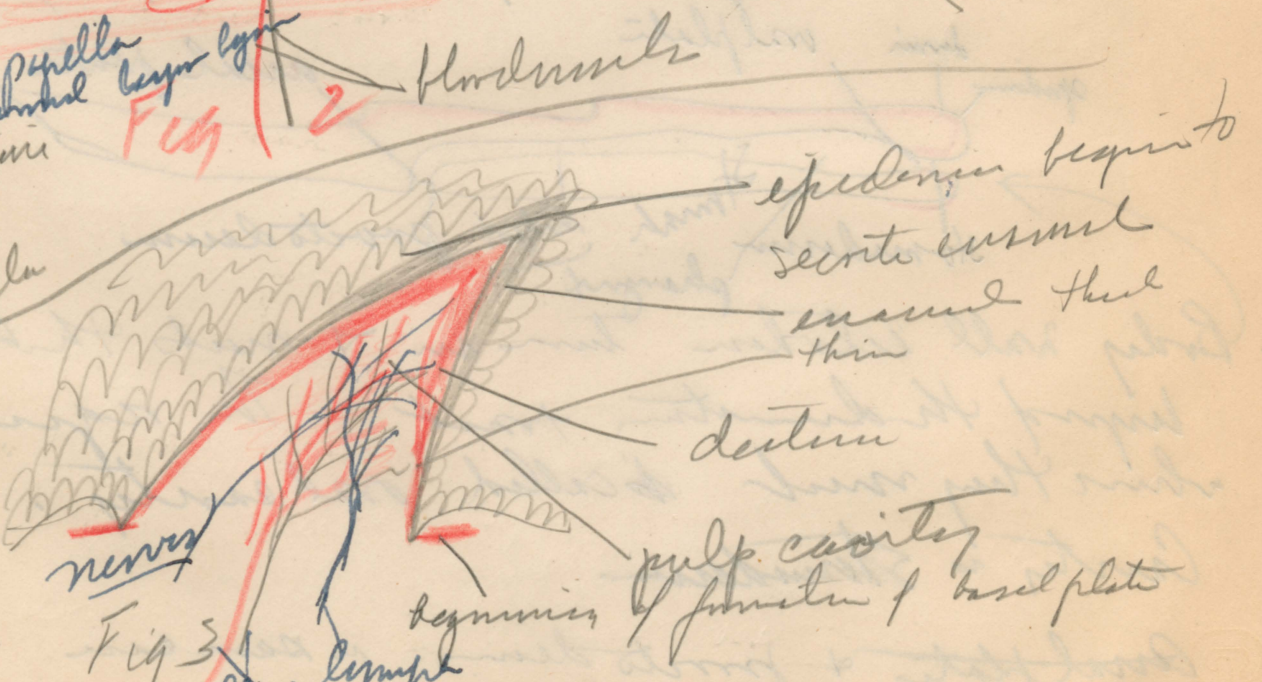
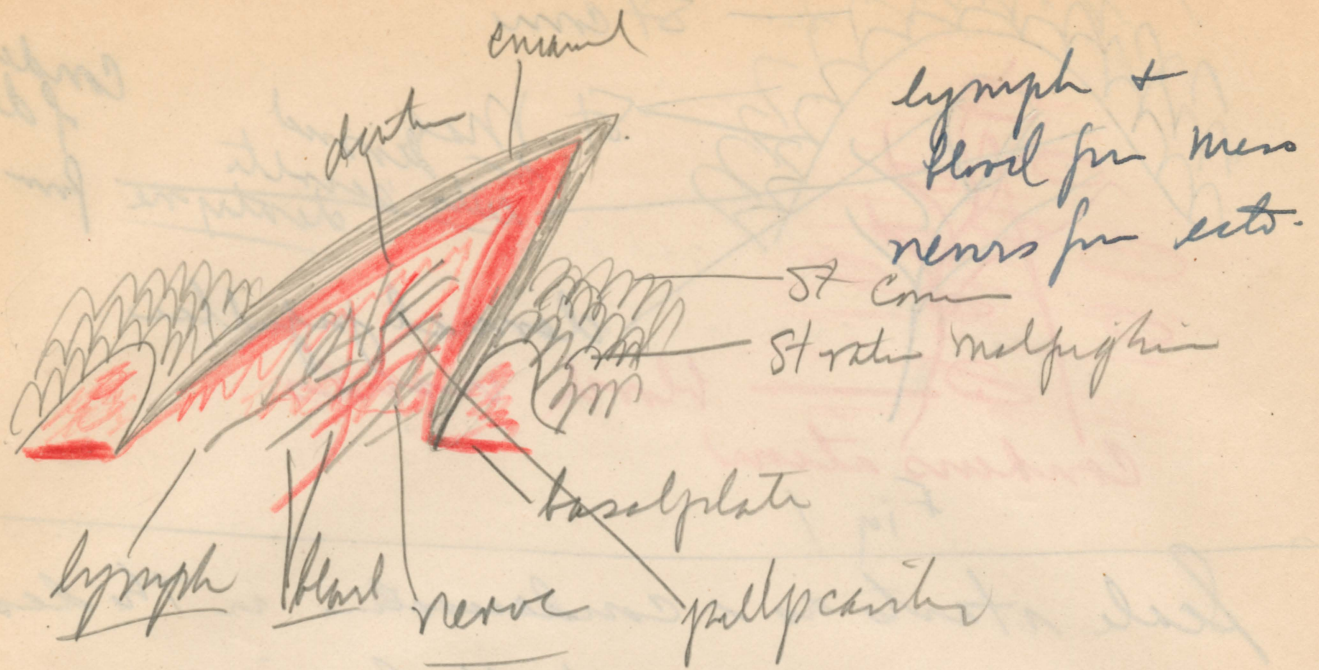
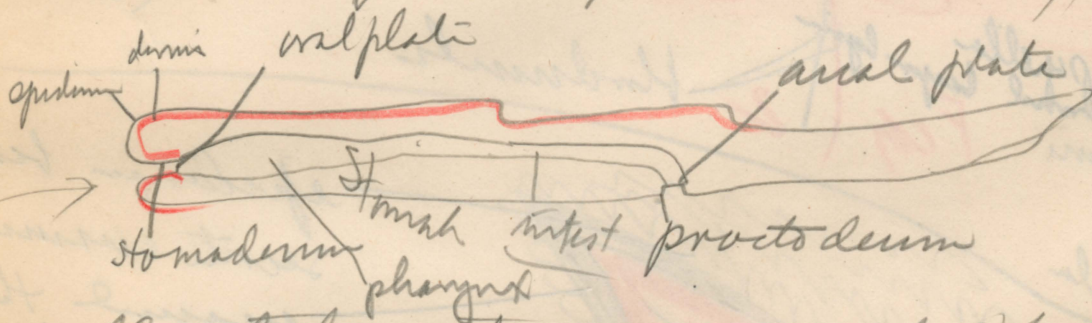


Fig 3

Note:
Low Malpighian layer secretes enamel
Further change of shape
Continued secretion of dentin
Hollowing out to form pulp cavity.



Complete development of
 Homology between teeth + Placoid
 scales -
 No Homology between teeth + other kinds of
 scales because of origin (demonstrate why)



Body wall ectoderm turns in + meets the lining
 beyond the stomoderm tract. The region
 where they meet is called oral cavity.

Cavity is stomoderm

Anal plate + proctoderm is same as

lining back to pharynx as body wall ectoderm
 scale part is tooth

Review:

4/24/40

Include Epidermis only.

Body wall turns in (invagination)

oral plate bounded by -

Alimentary canal is not complete until rupturing of oral plate & anal plate

oral cavity & body wall continuous (same)

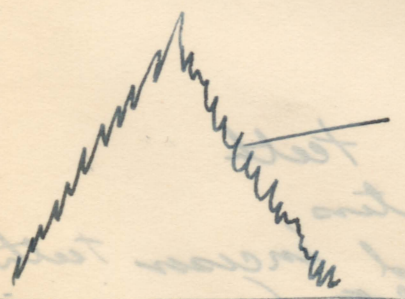
No mesoderm on oral plate.

Departure from scales to teeth is caught in dry fish.



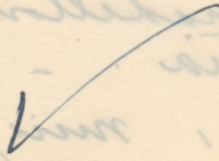
Evidences ^(teeth)

Scales in rows beneath old teeth



serrated teeth - saw-like

teeth of shark



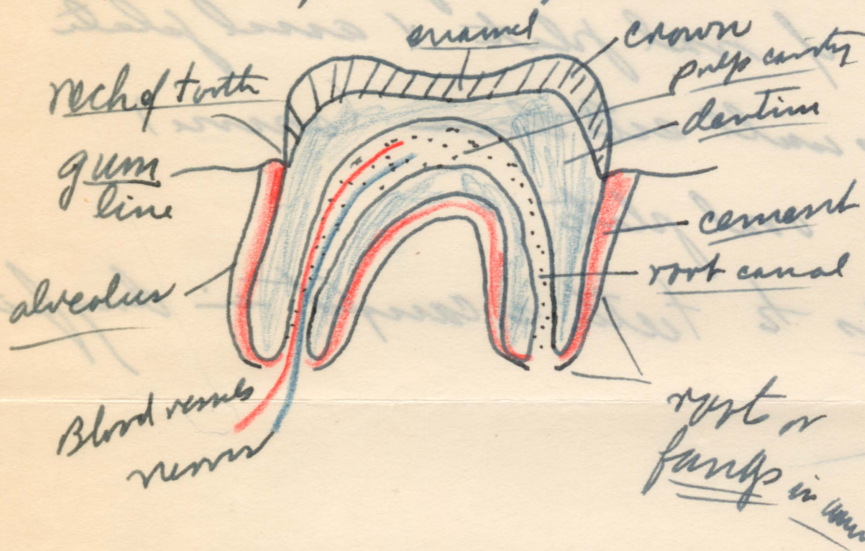
Homology of teeth & scales:

Human same embryonic origin - but function may or may not be the same.

- 1 kinds
 - incisors
 - canine
 - premolars
 - molars.

2 Structure of adult molar:

"the teeth are skin products. yet they are digestive system."



socket = alveolus in which tooth fits mandible & maxilla.

Parts of tooth.

- 1 - crown
 - 2 - neck
 - 3 - roots.
- fangs in mind*

Cusps are irregular dents in teeth

Teeth are significant criteria for differentiating ~~animals~~ the orders of mammals

Mammalia

Orders:

1. Edentata - without incisor teeth
armadillos, sloths, anteaters
2. Rodentia - highly developed incisor teeth.
rats, mice, beavers, rabbit. (growing animal)
3. Carnivora - (meat eating). Canine teeth highly developed.
cats, dogs, wolves, etc.
4. Ungulates - (reference to hoofs - hoofed animal)
5. Primates - ^{horses} donkeys, ^{zebras} mules, etc.
~~man~~ humans

Endo skeleton :

A Definition

~~internal supporting skeleton.~~

internal support of the body

organs plastered on skeleton

muscles attached to bone

seems odd - exo skeleton seems better -

Skeleton is supporting - Skull is protective

B Parts of Skeleton

1) Axial

2) Appendicular.