

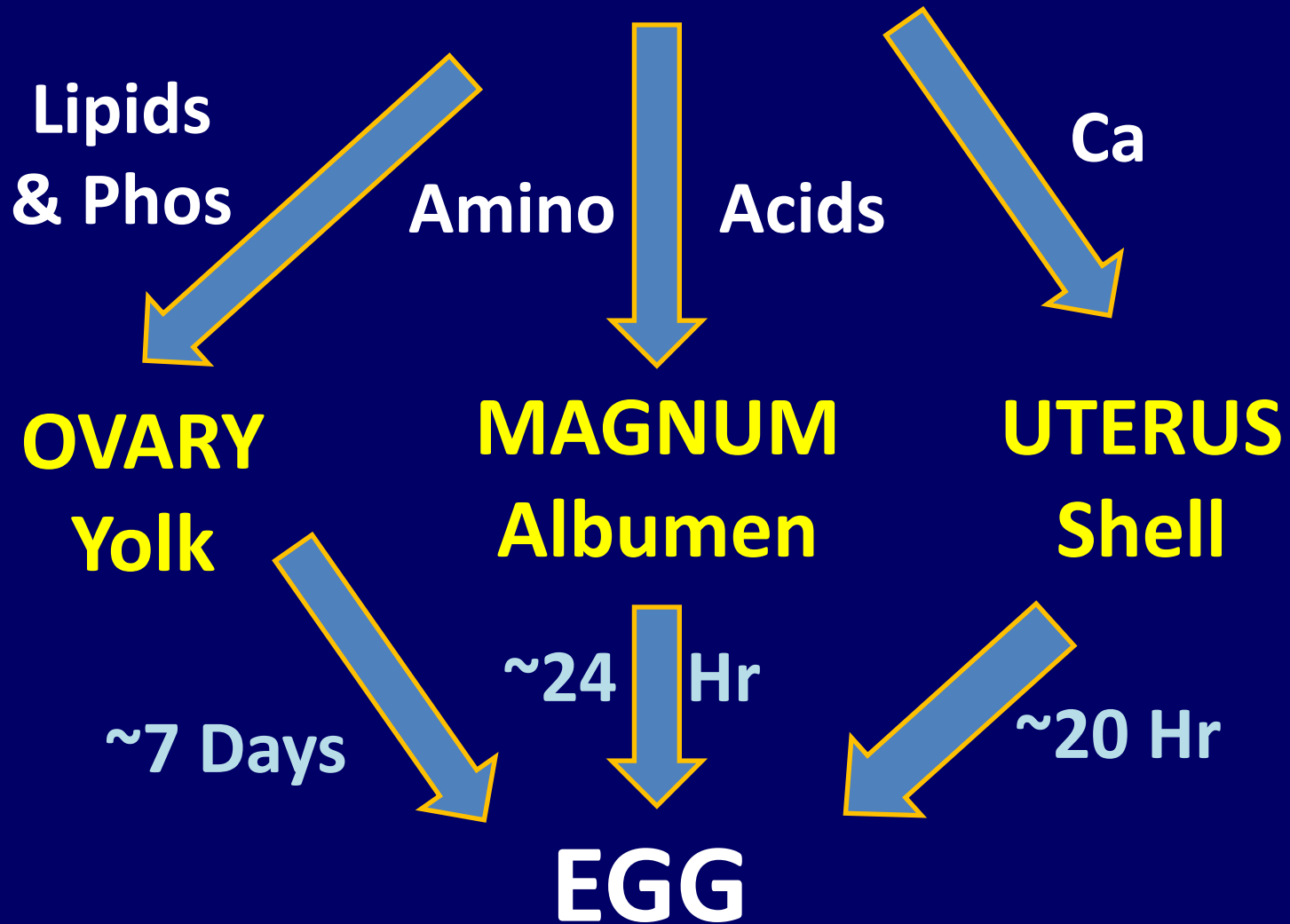
EGG, EMBRYONIC RESERVES & FIRST FEED

Ed Moran

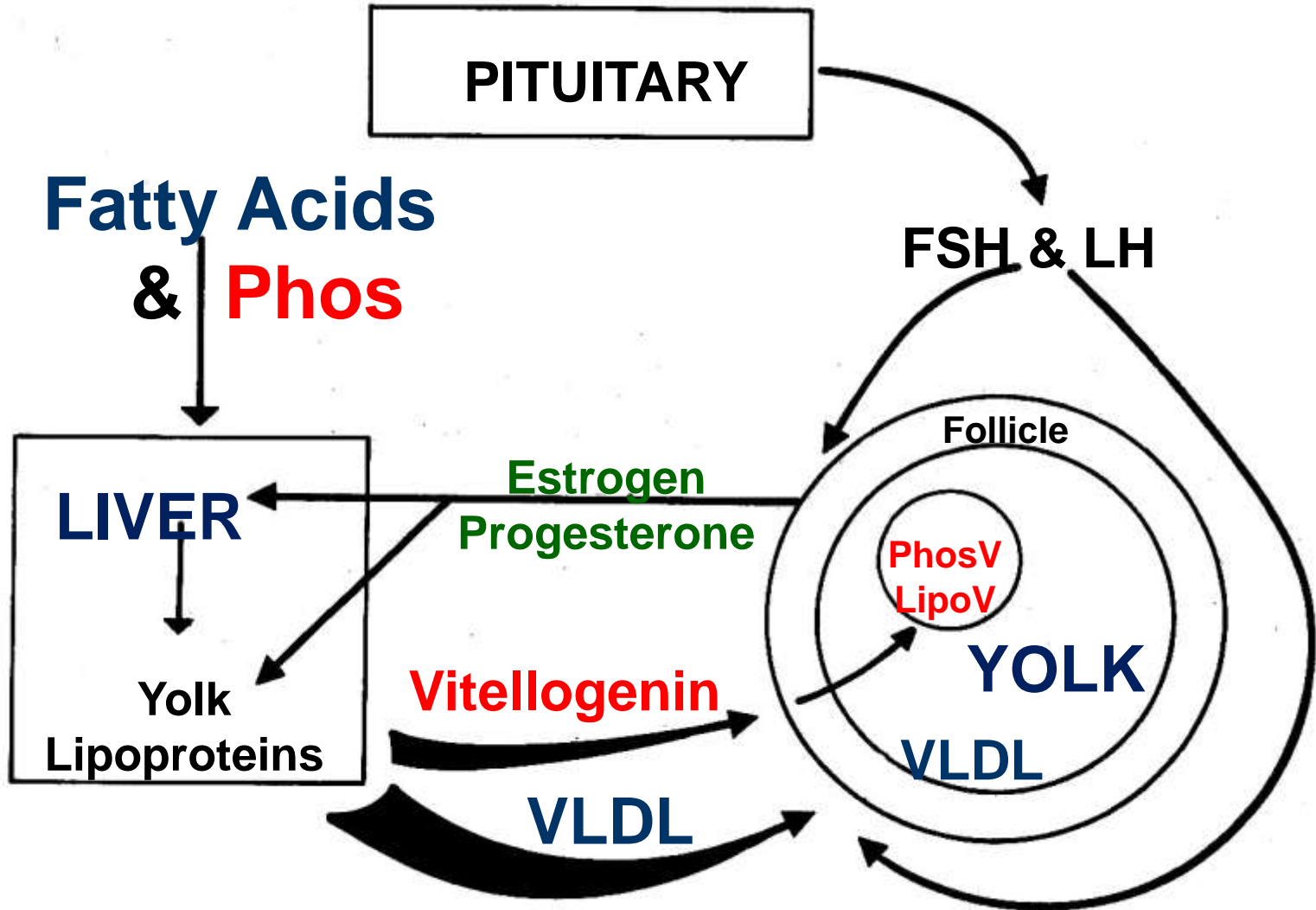
Poultry Science Department

Auburn University AL

HEN NUTRITION

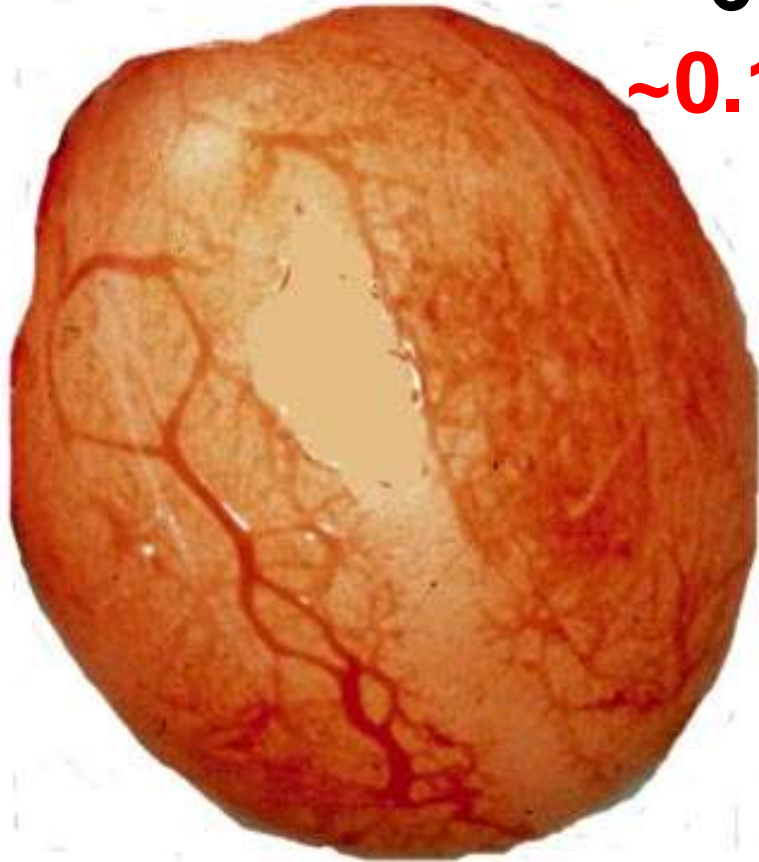


LIVER & YOLK FORMATION



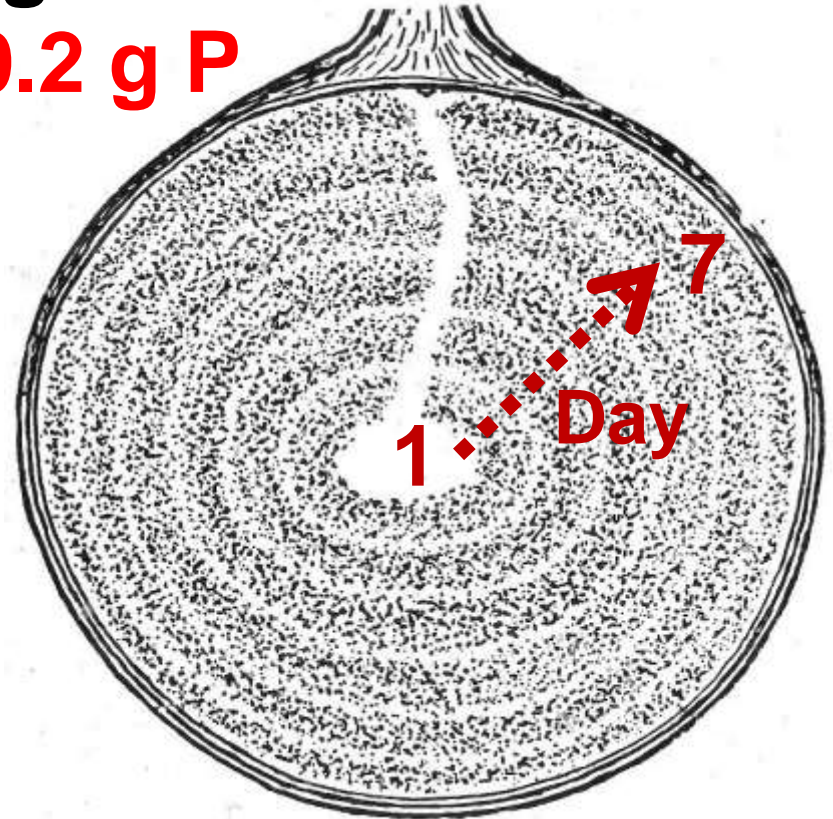
PREOVULATORY FOLLICLE

~6-7 g FAT
~0.1-0.2 g P



Vascularization

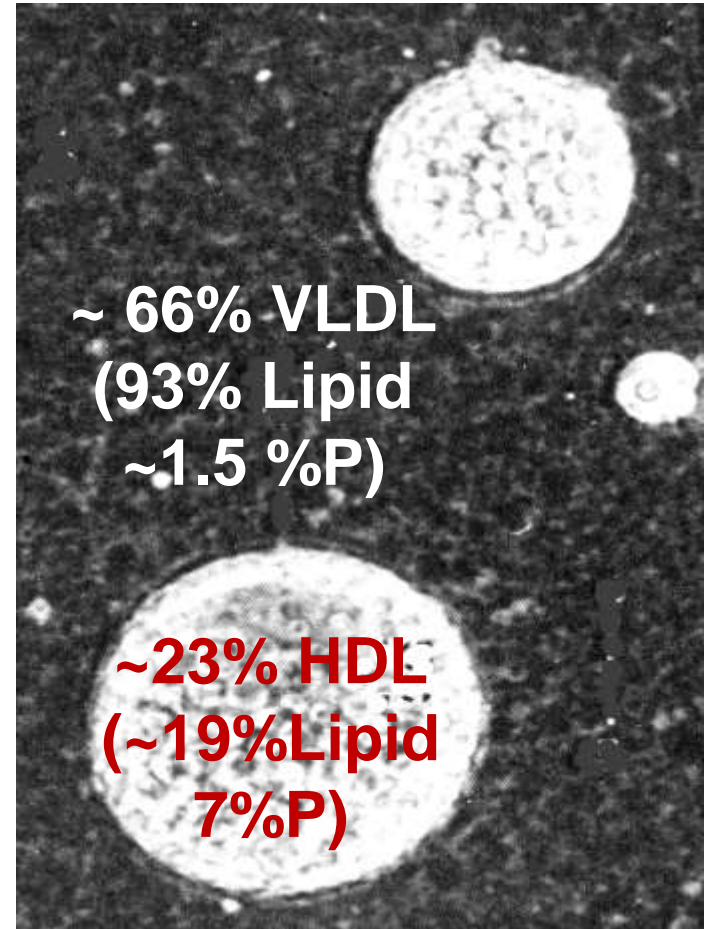
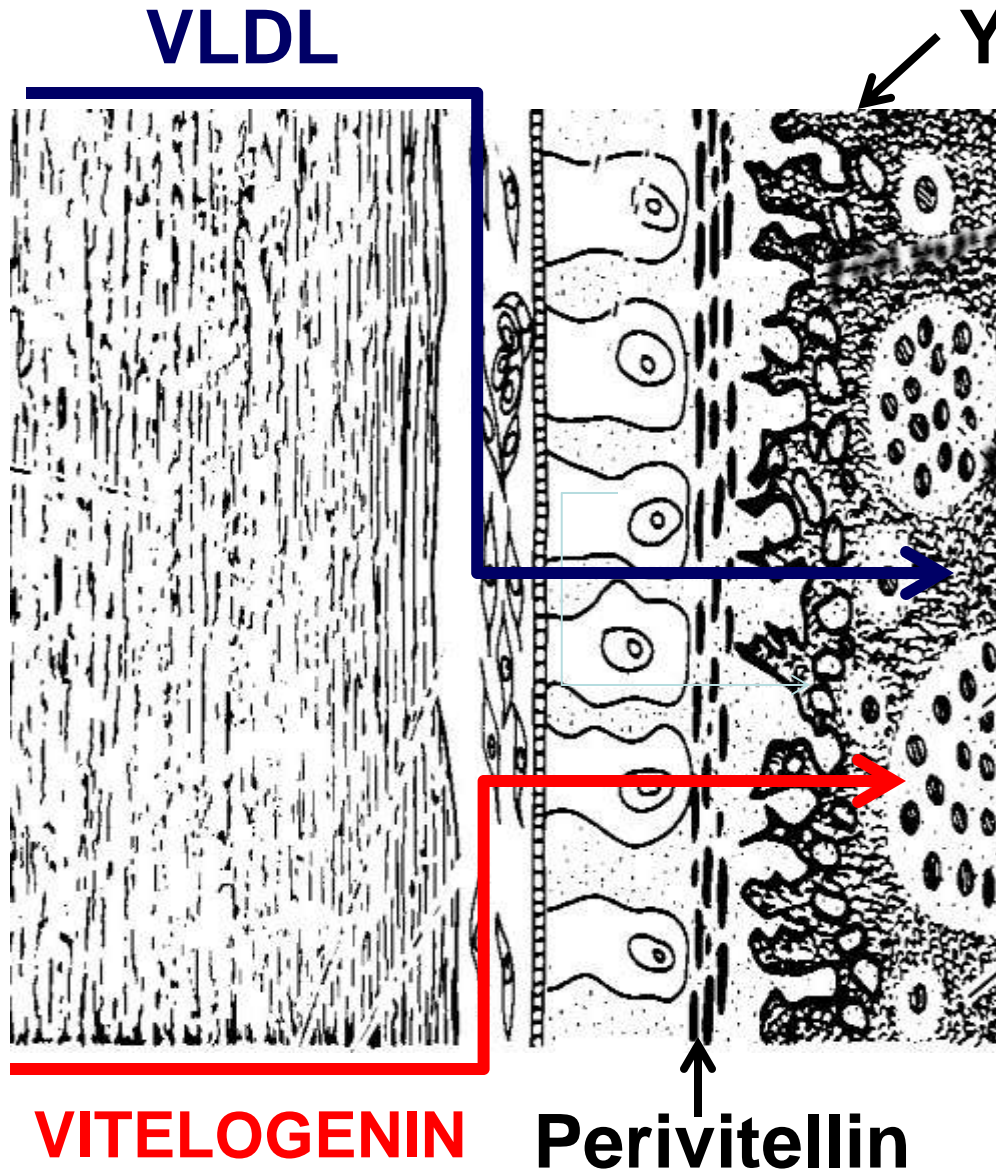
Moran, 1987



Cross-Section

Romanoff & Romanoff, 1963

YOLK LIPOPROTEINS

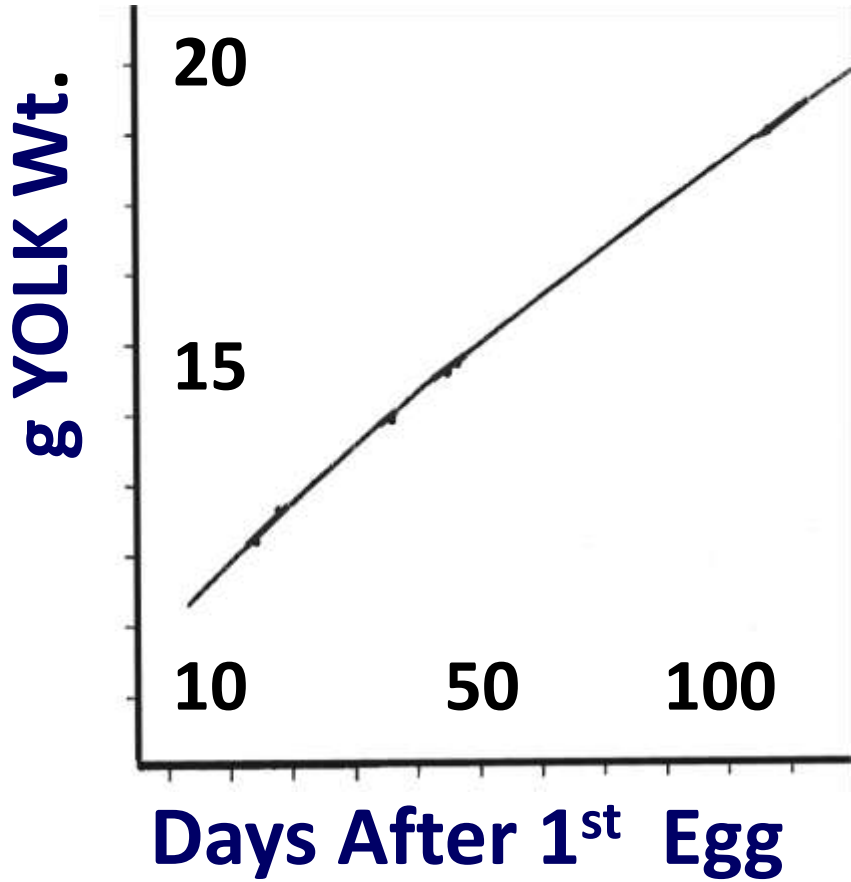


Bellairs *et al.*, 1972

YOLK QUANTITY

HEN AGE

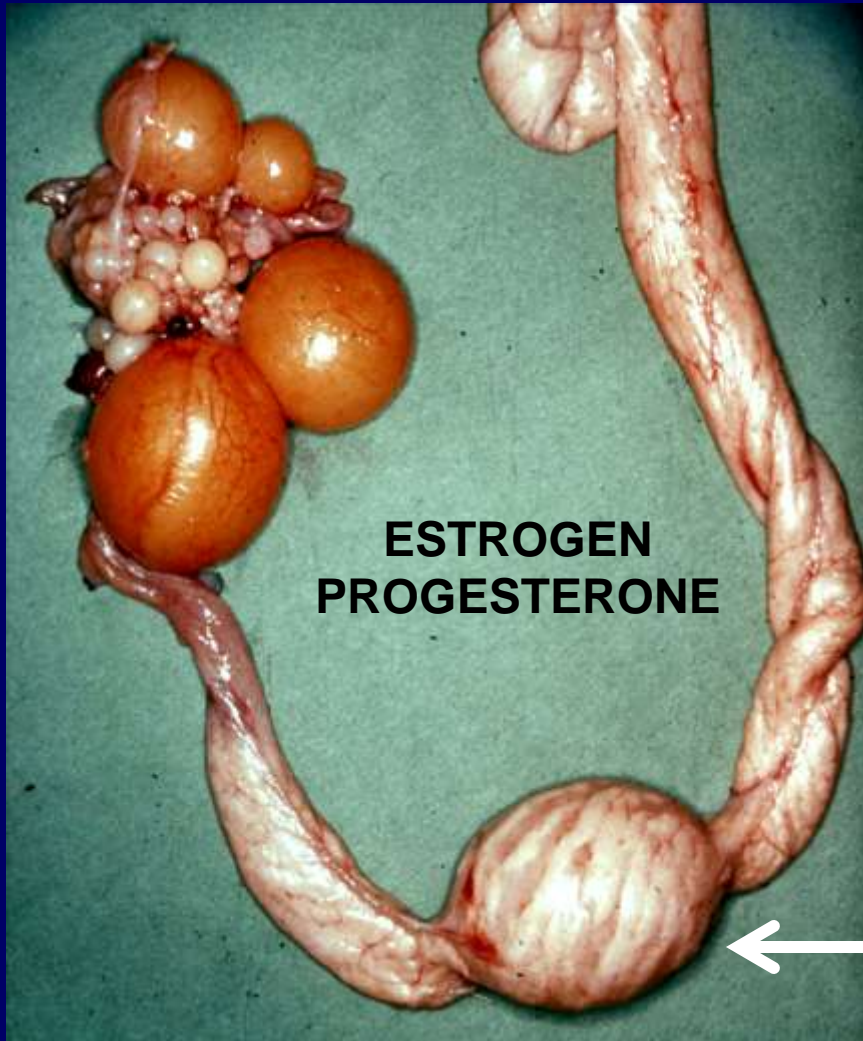
FEED EFA



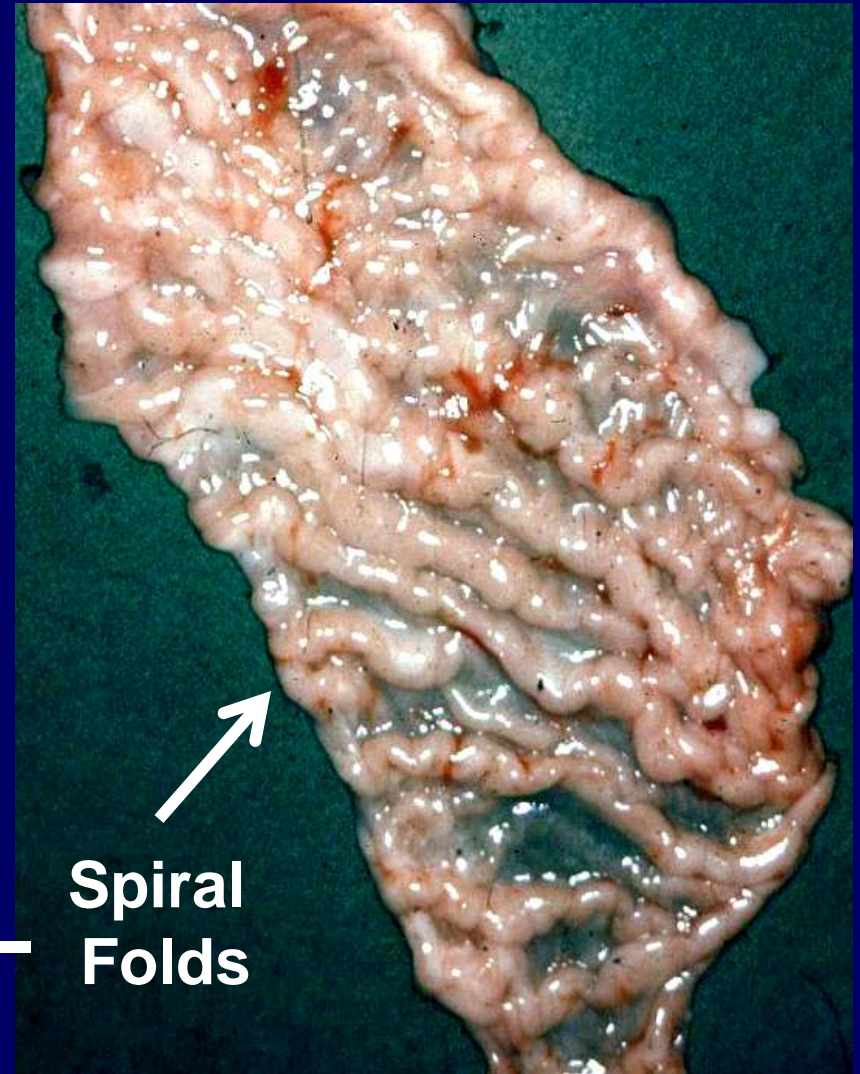
<u>Linoleic Acid %</u>	<u>% Egg Prod.</u>	<u>g Egg Wt</u>
0.5	72.0	50.4
1.0	75.0	52.4
2.0	76.7	53.5
4.0	81.9	52.5

Menge, 1968

OVIDUCT MAGNUM



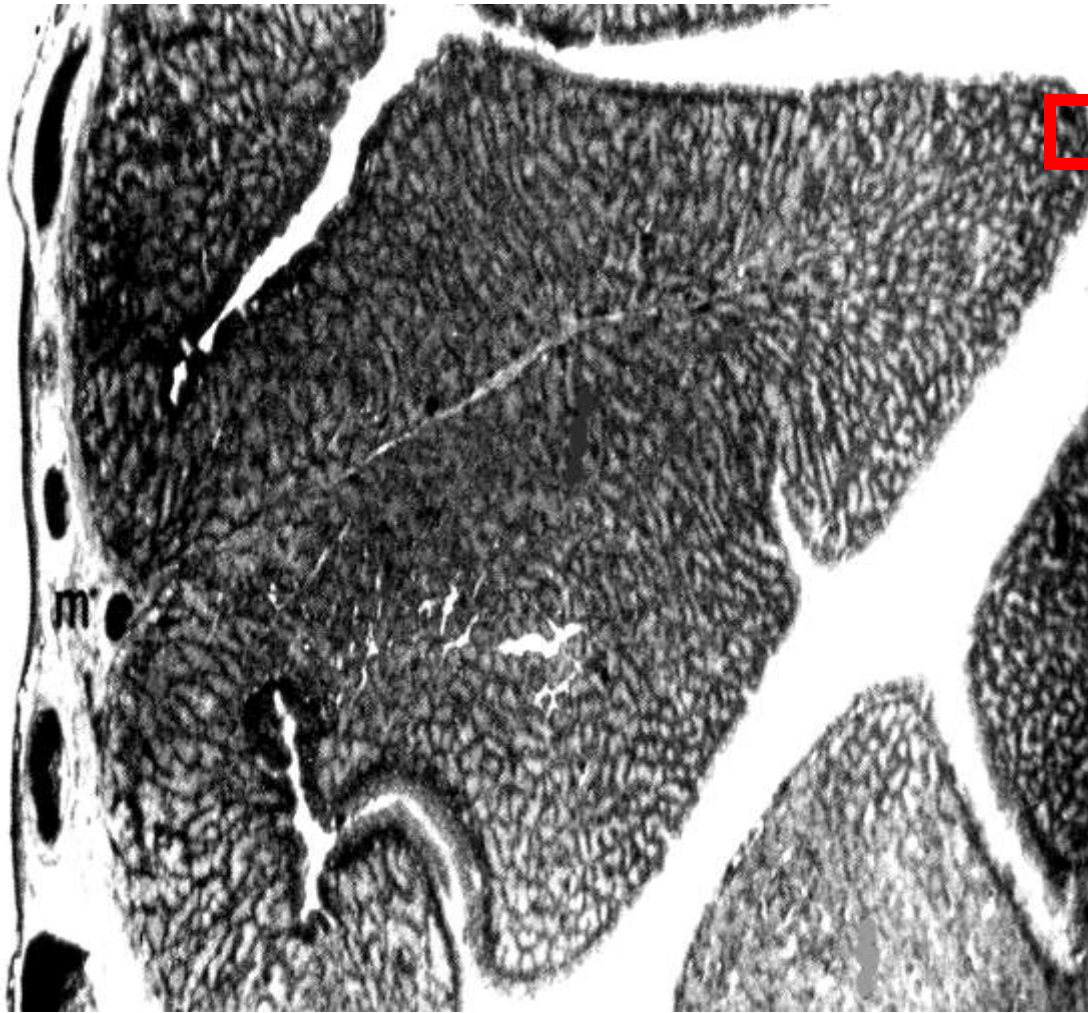
OVUM IN LUMEN



MUCOSA SURFACE

MAGNUM & ALBUMEN

Ovomucin Cells



MUCOSAL FOLD

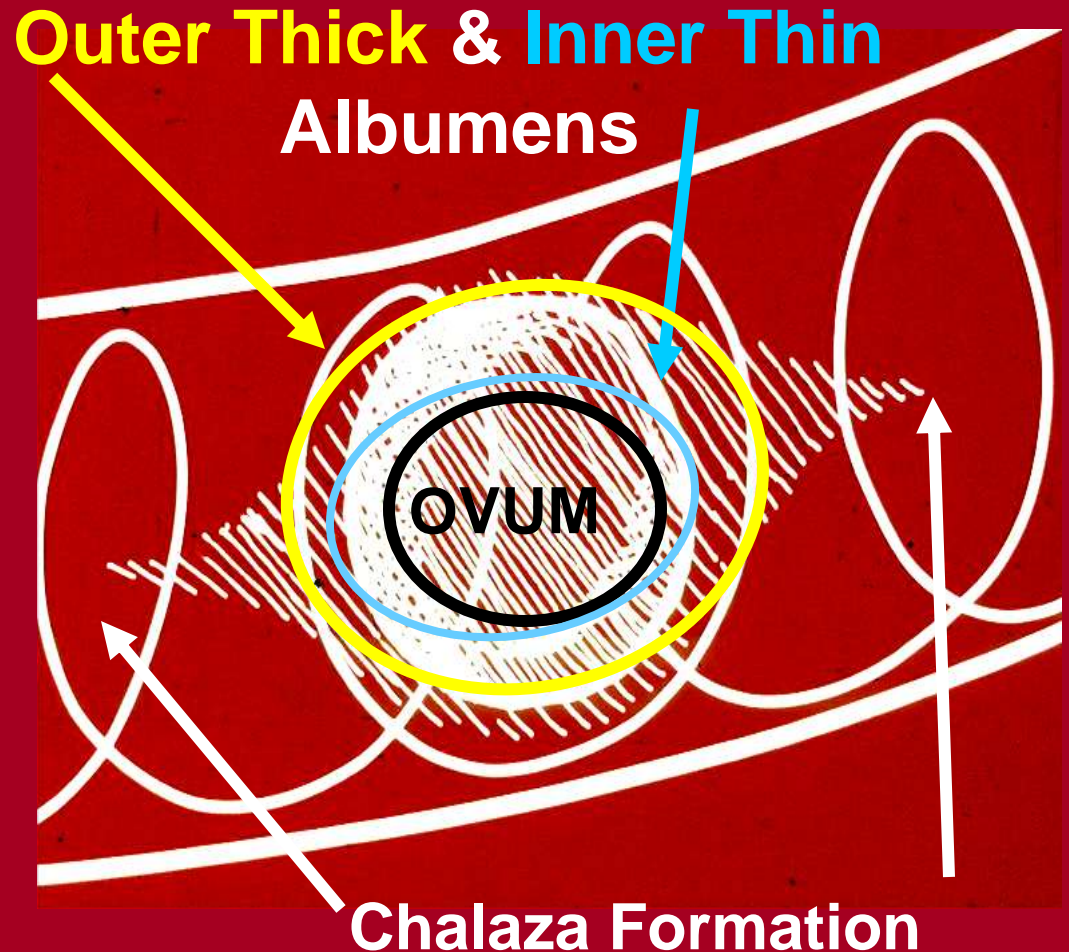


Albumen Cells

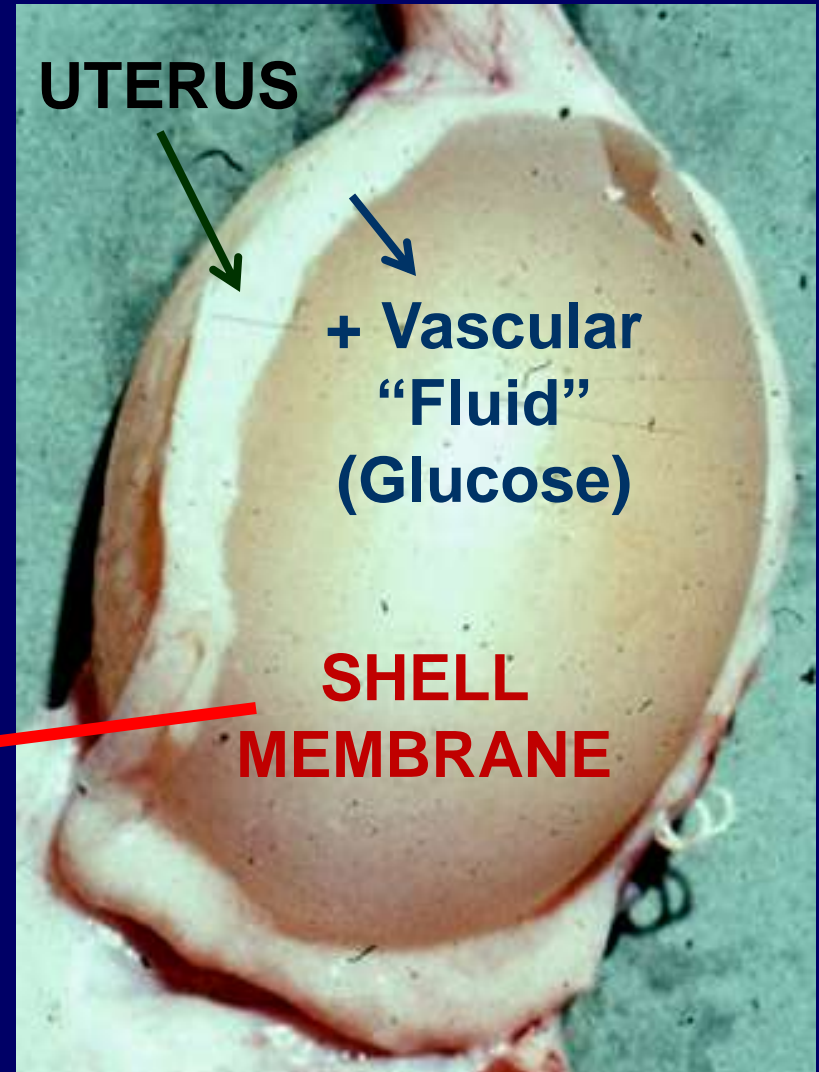
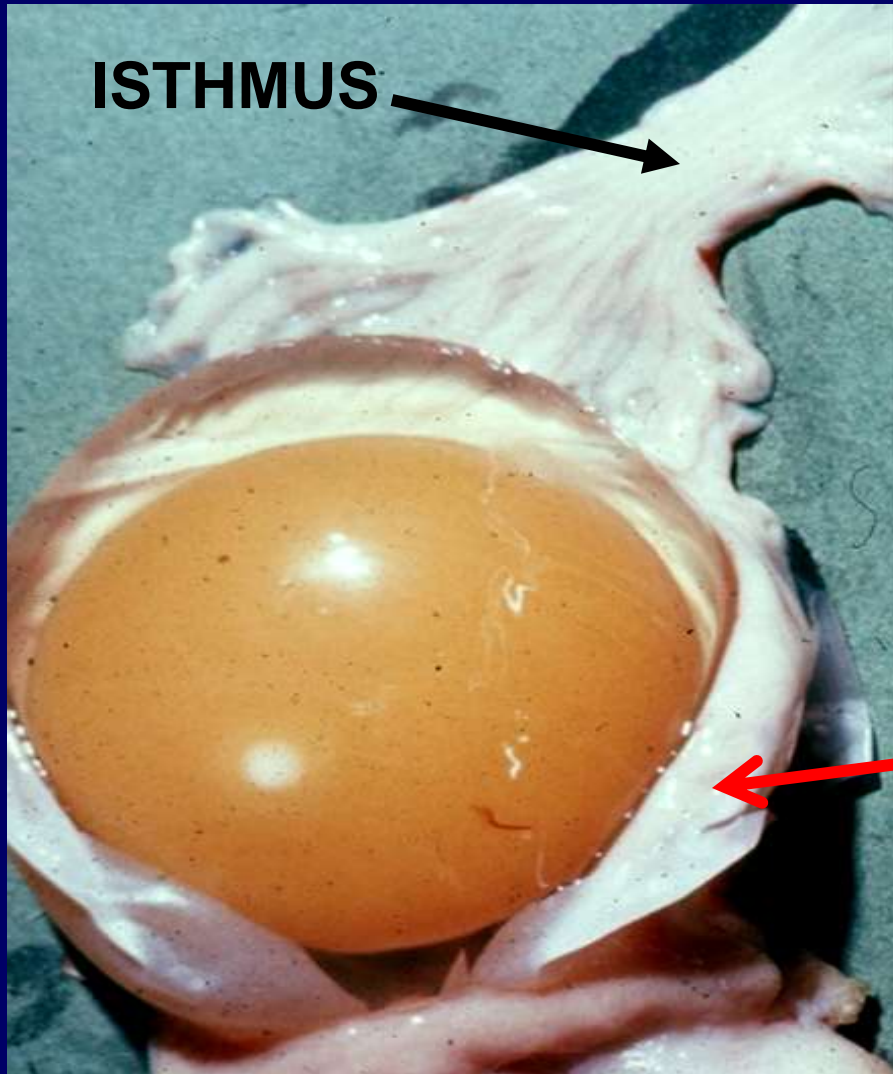
MAGNUM MOTILITY & ALBUMENS

OVOMUCIN SEGREGATION

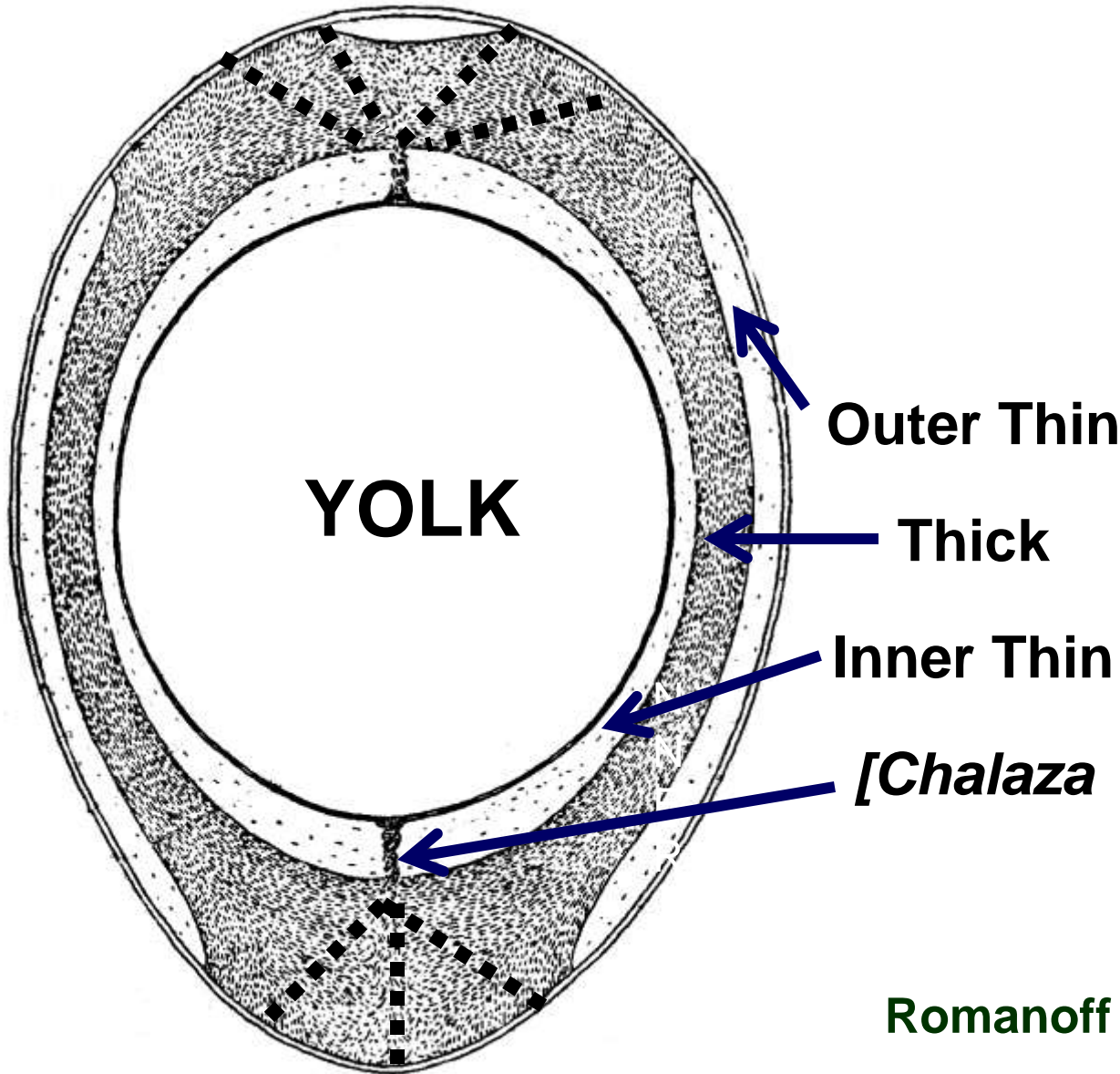
<u>Composite</u>	
<u>EAA</u>	<u>%CP</u>
Threo	4.7
Lys	6.4
Meth	4.0
Cyst	2.6
Trypt	1.8
Isol	6.4
Val	7.8



UTERUS & ALBUMEN



EGG ALBUMEN STRATIFICATION



% Distribution

<u>Total</u>	<u>Solids</u>
23	11
57	12
17	14
2	16]

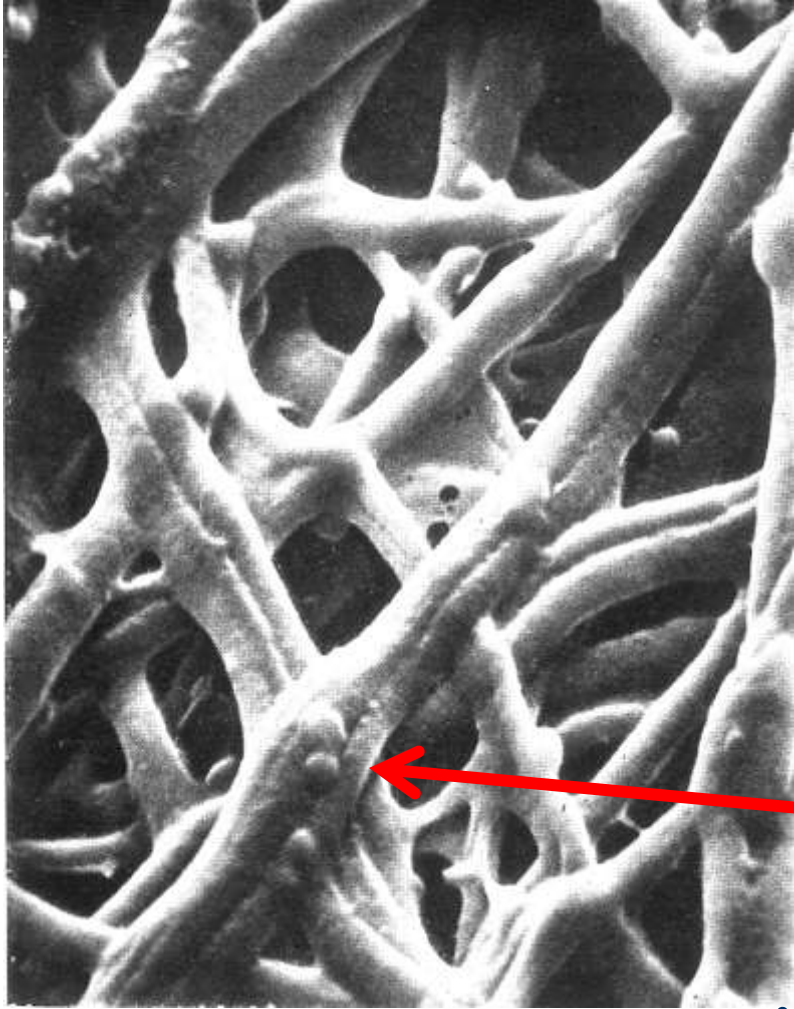
Romanoff & Romanoff 1963

ALBUMEN COMPOSITE PROTEINS

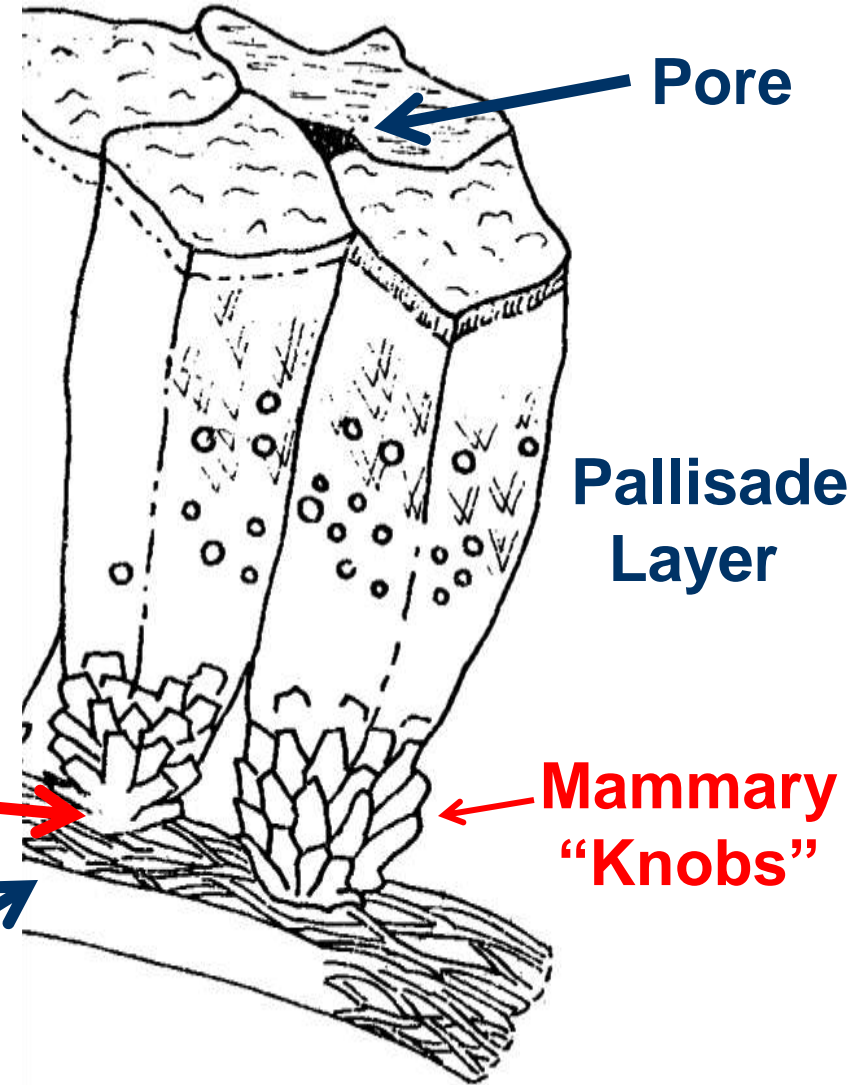
	<u>%Tot</u>	<u>%CHO</u>	<u>%CHO-NH₂</u>
Albumen	54	1.8	1.2
Transferin	13	0.9	1.7
Mucoid	11	8.5	13.6
Lysozyme	3.0	0	0
Mucins	~2	9.8	7.1

Robinson, 1972

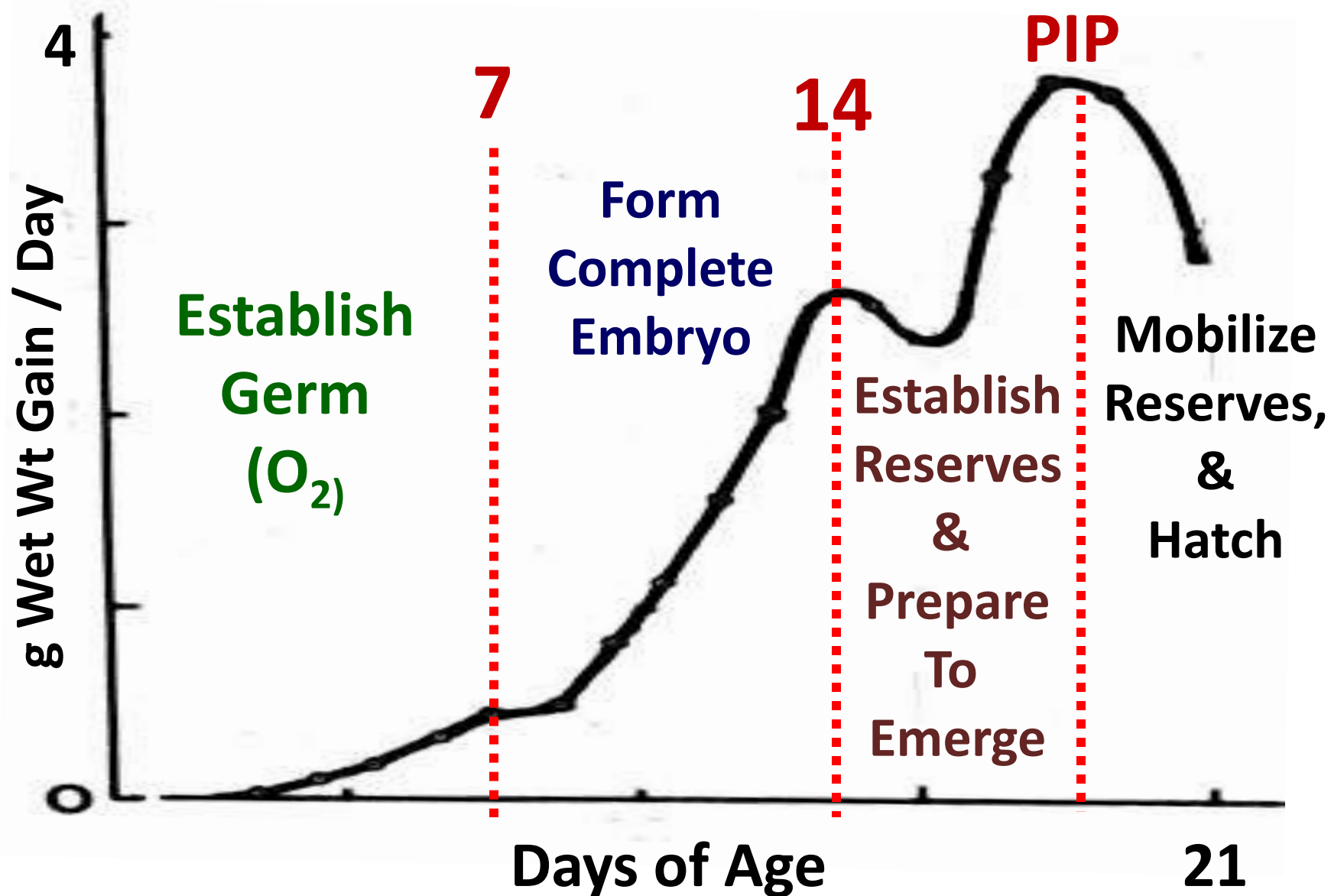
SHELL MEMBRANE & CALCIFICATION



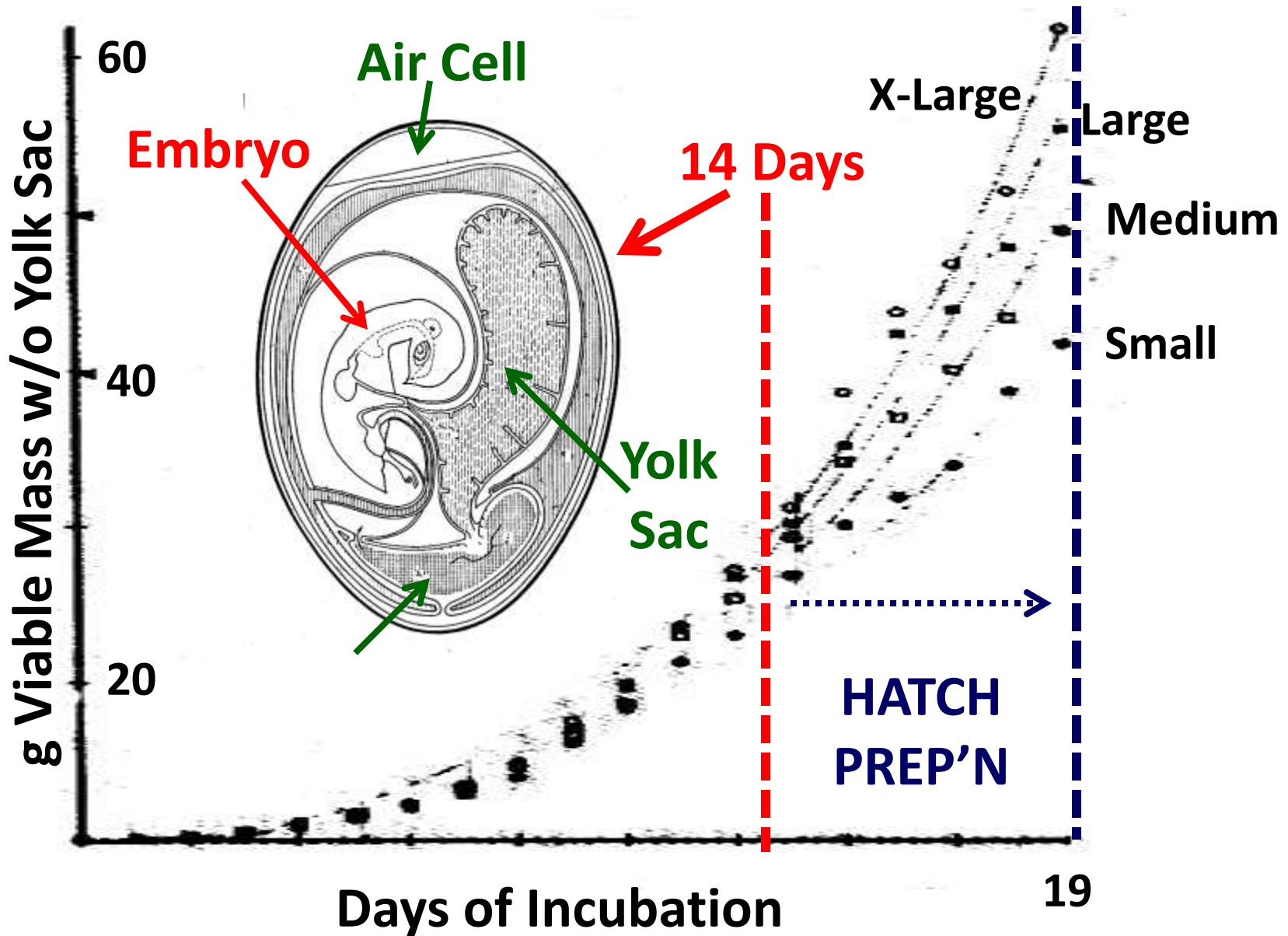
SEM OUTER SURFACE



INCUBATION EVENTS



EGG WT & EMBRYO MASS



14-19D & ALBUMEN

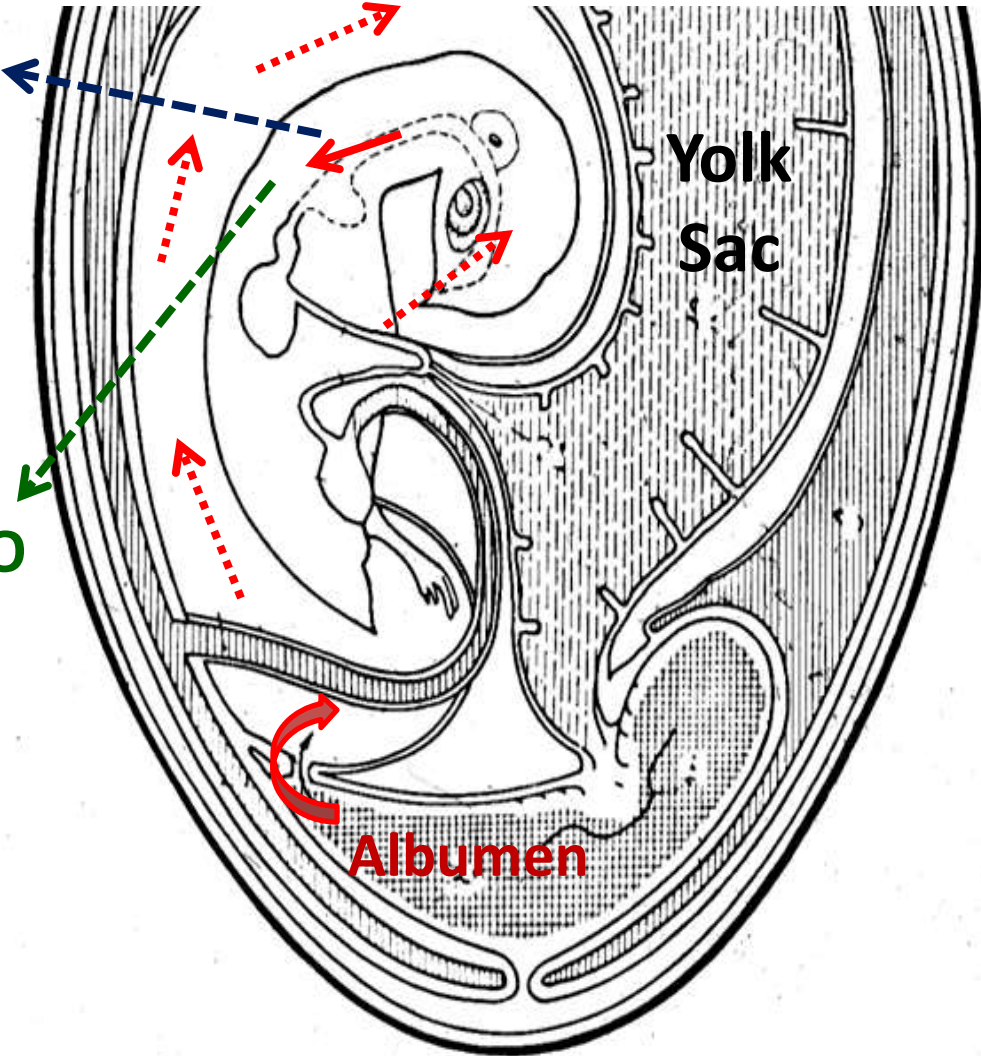
Consumption, Vascular Uptake & Use

HATCHING MUSCLE



AA

CHO



Yolk Sac

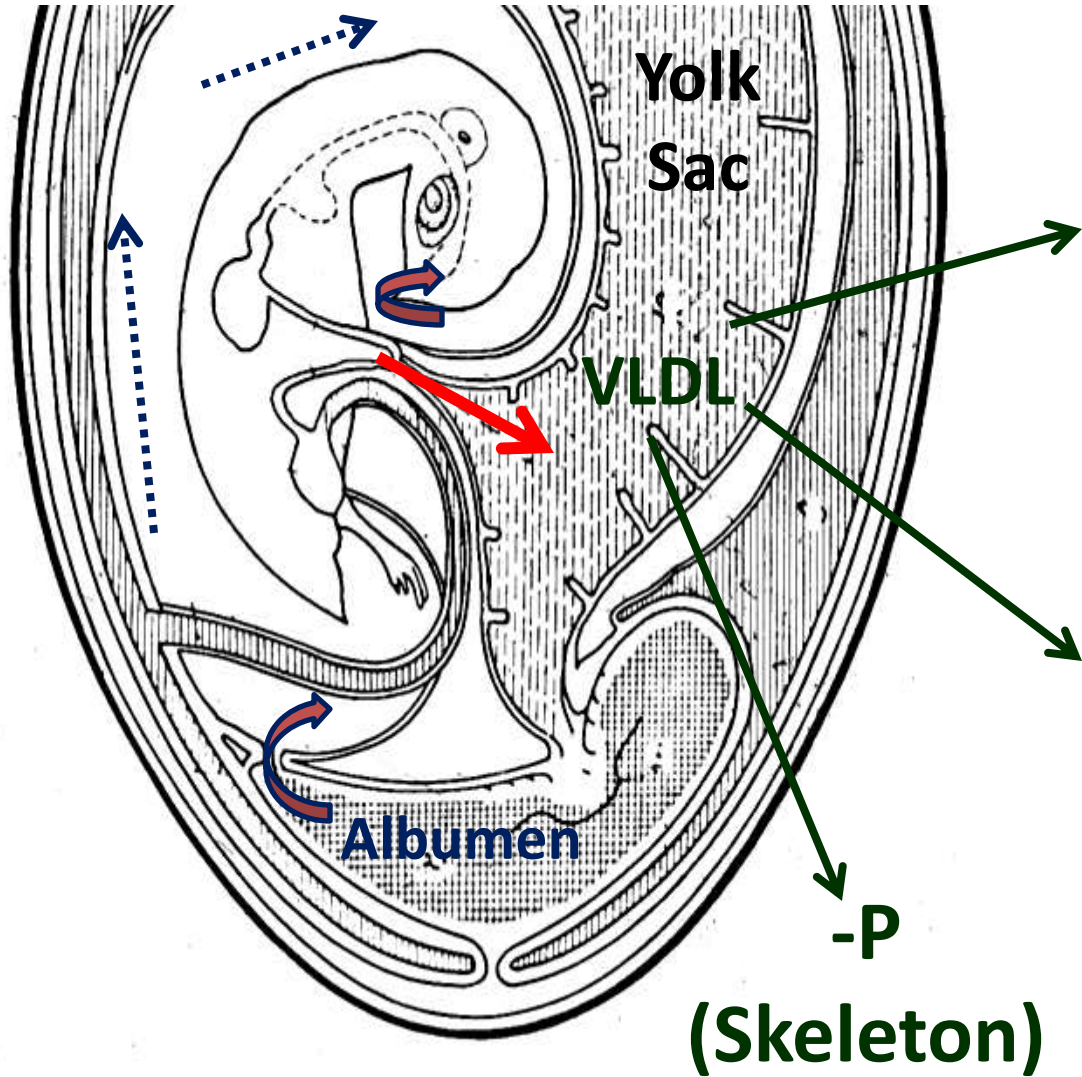
Albumen

mgGlycogen/100g

<u>Day</u>	<u>Liver</u>	<u>Muscle</u>
14	1625	194
16	2648	217
18	2890	359

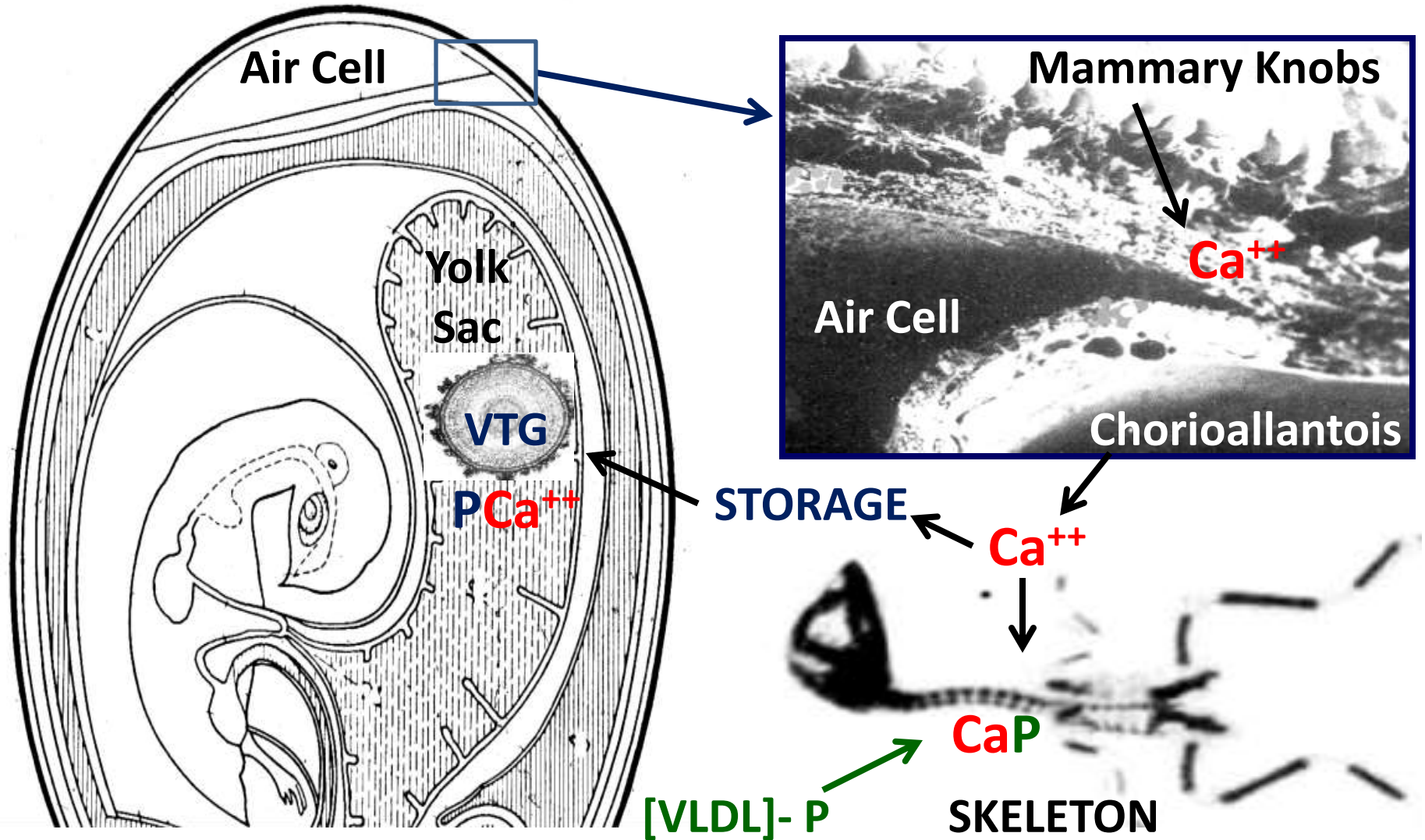
14 - 19D YOLK SAC LIPIDS

VLDL & Body Distribution

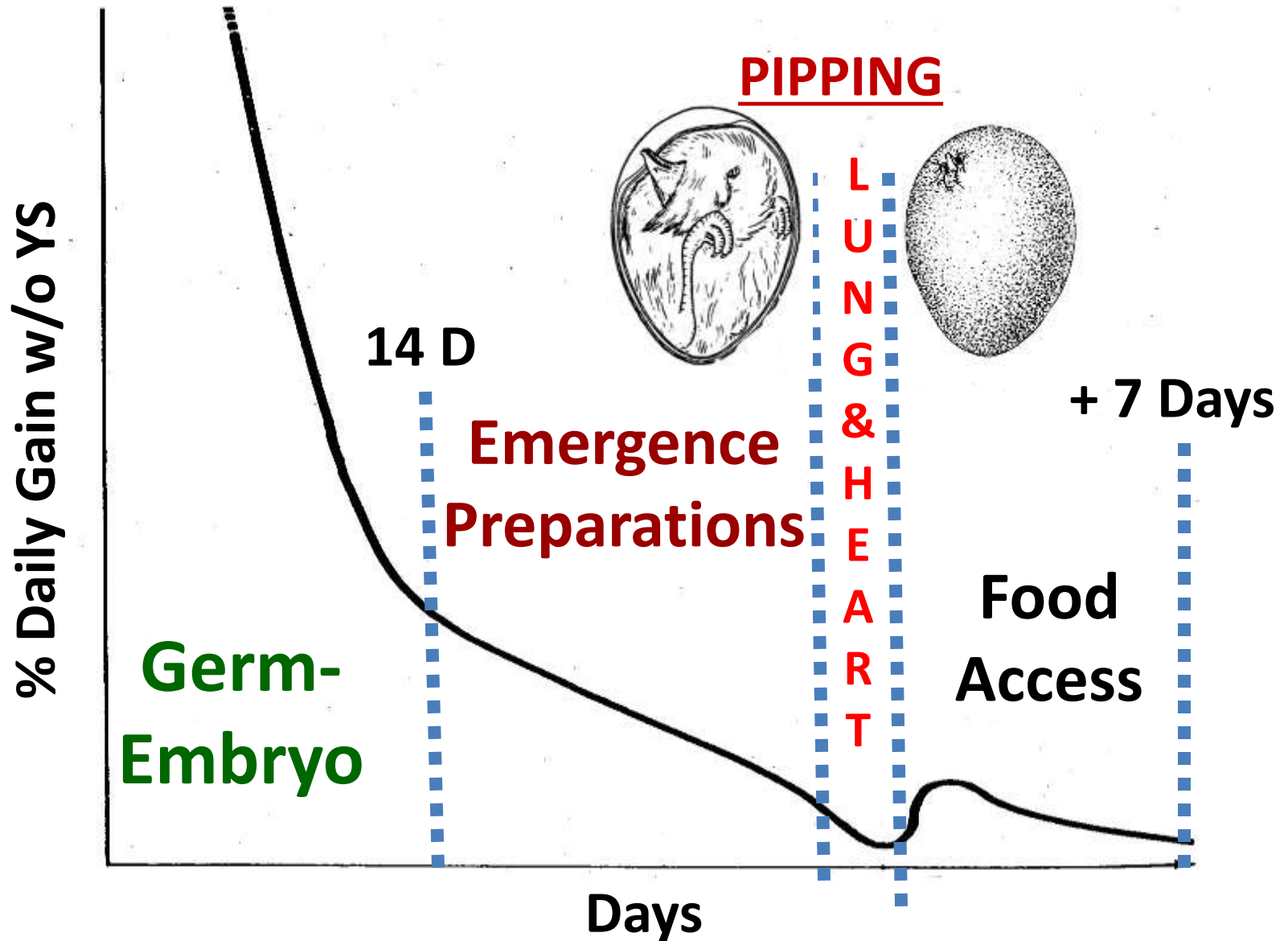


14-19D & SHELL **Ca** TRANSFER

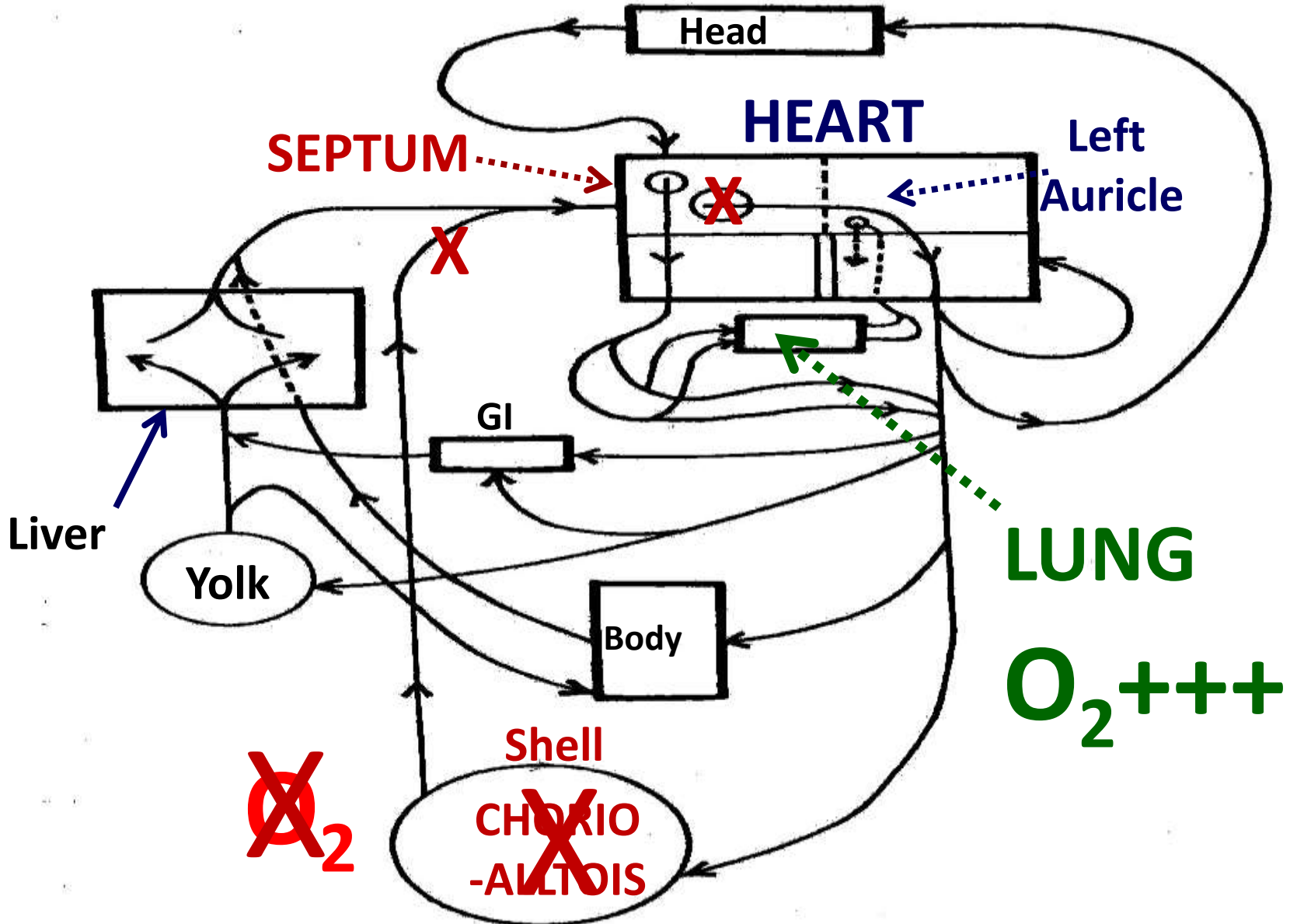
Skeleton & Yolk Sac HDL



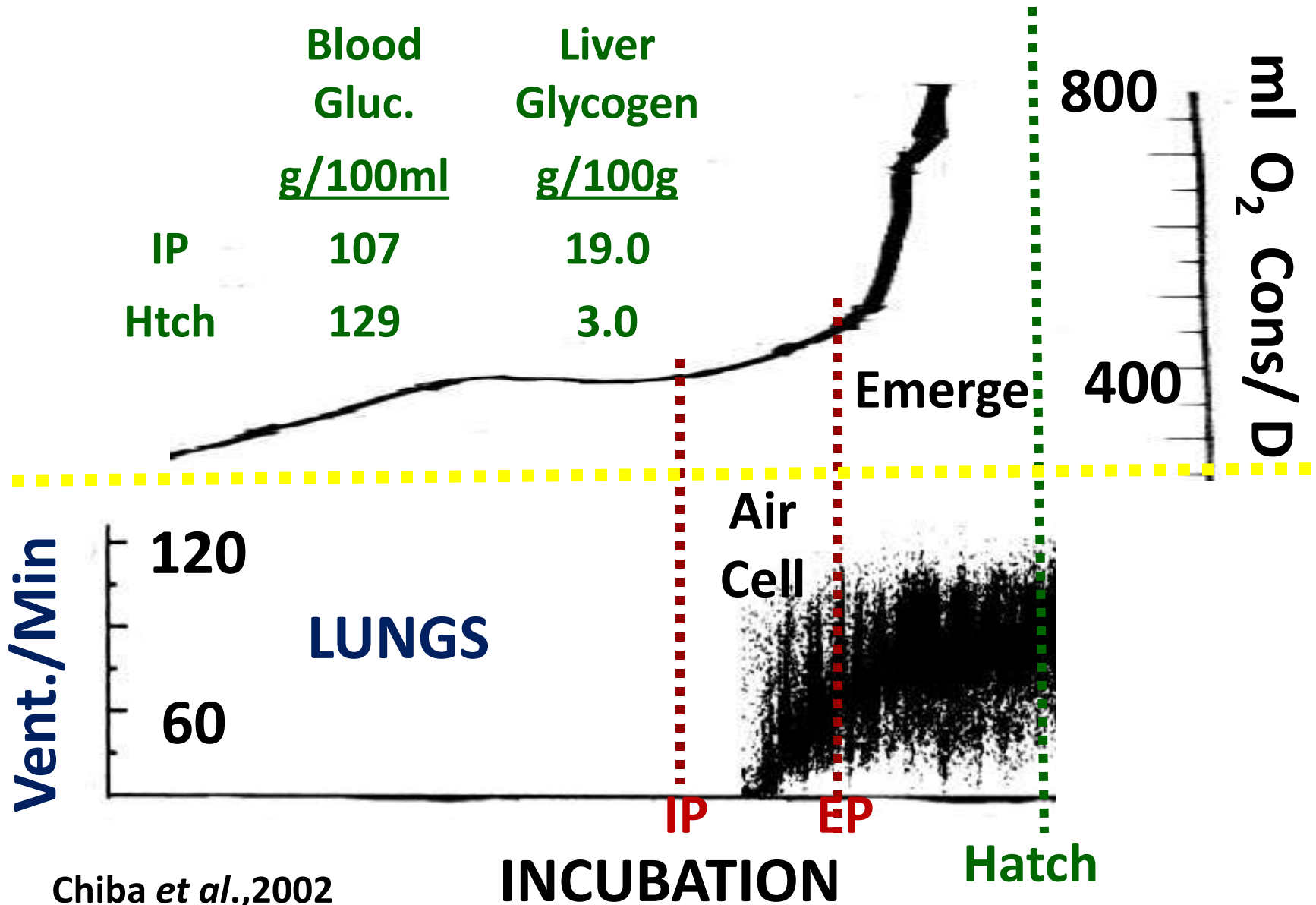
BW CHANGE & HATCHING TRANSITIONS



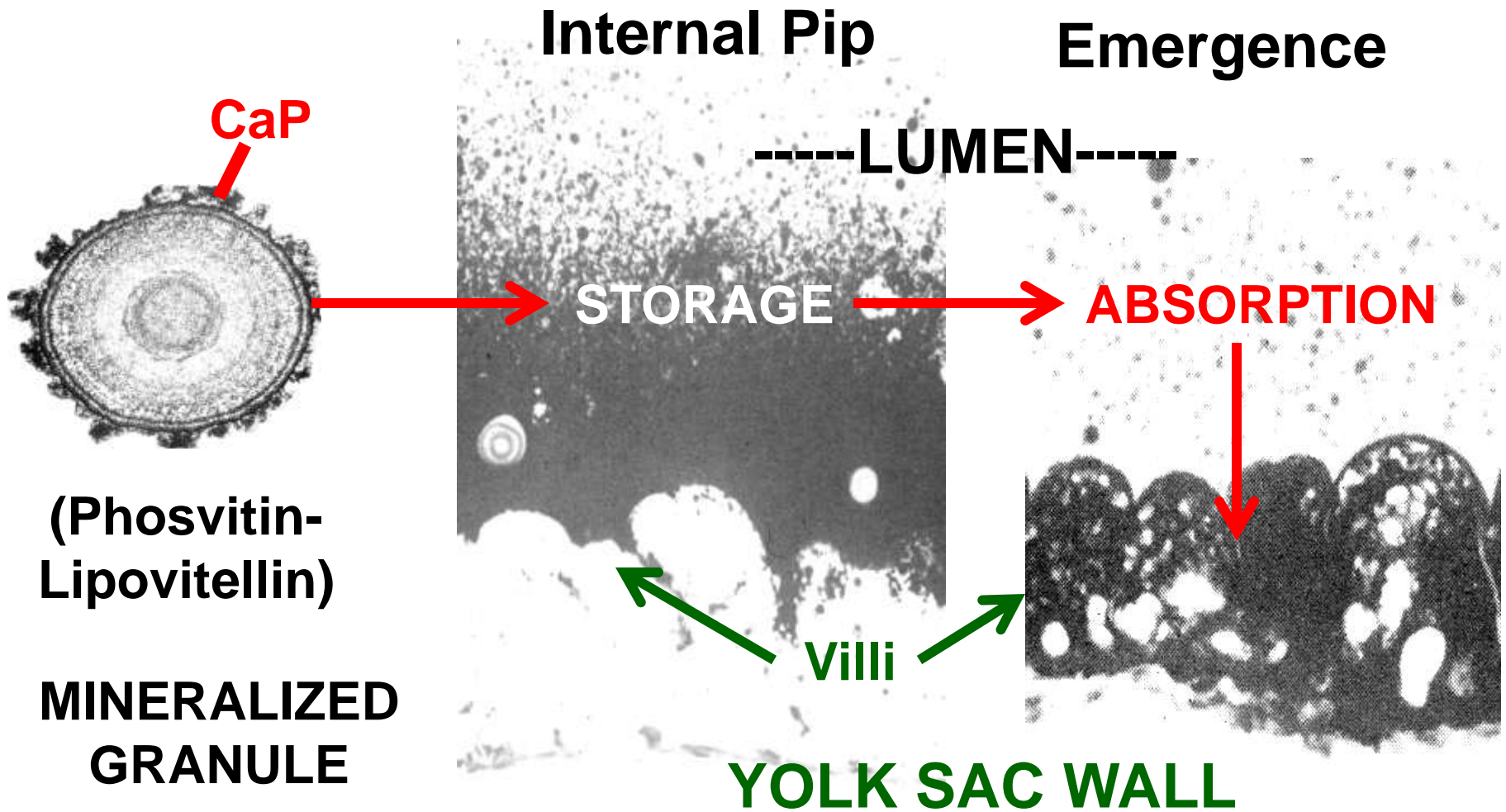
PIPPING & VASCULAR MODIFICATIONS



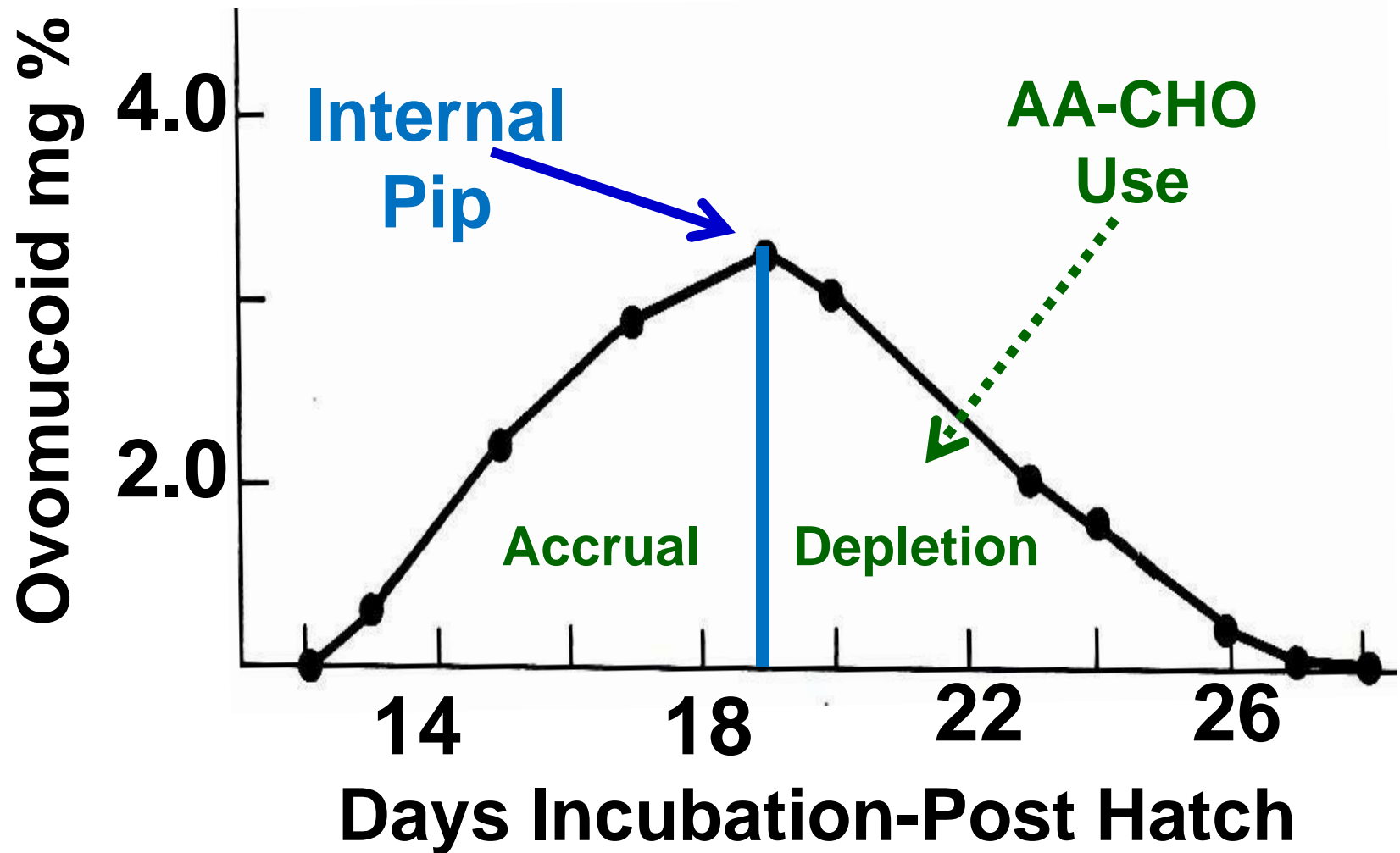
PIPPING, PULMONARY ACTIVITY & CHO



PIPPING & YOLK SAC VTGN-CaP



PIPPING & VASCULAR ALBUMEN



Oegema and Jourdian, 1974

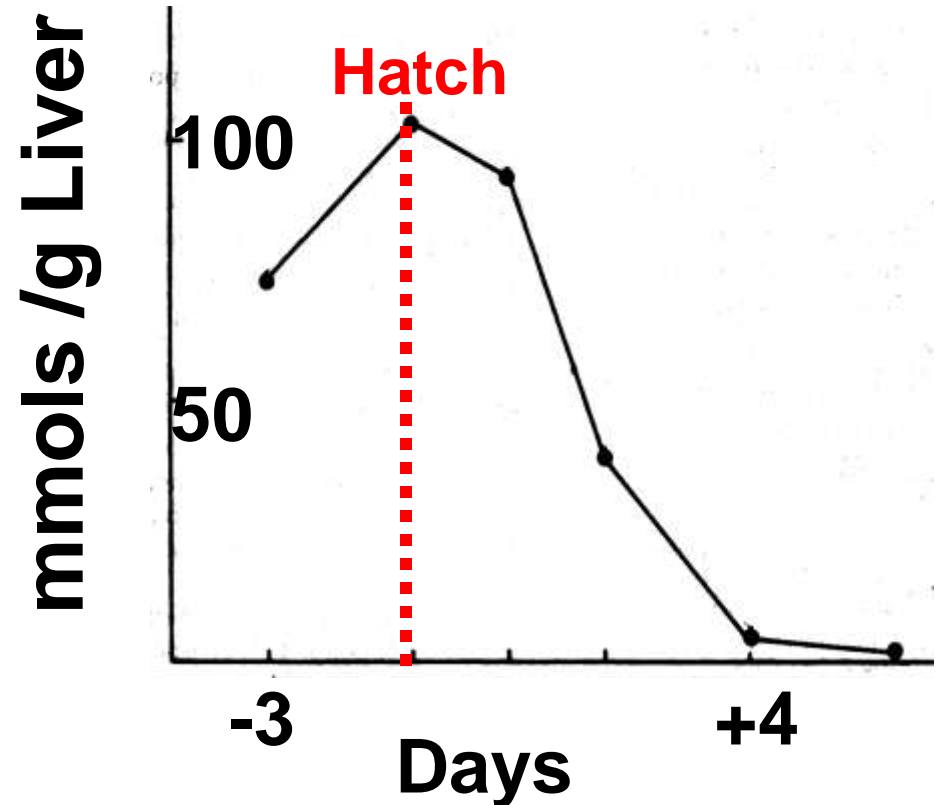
PIPPING & BODY LIPIDS

Subcut. Depots

<u>Incub- ation</u>	<u>Total mg</u>
16D	126
IP	450
Htch	500
+7D	75

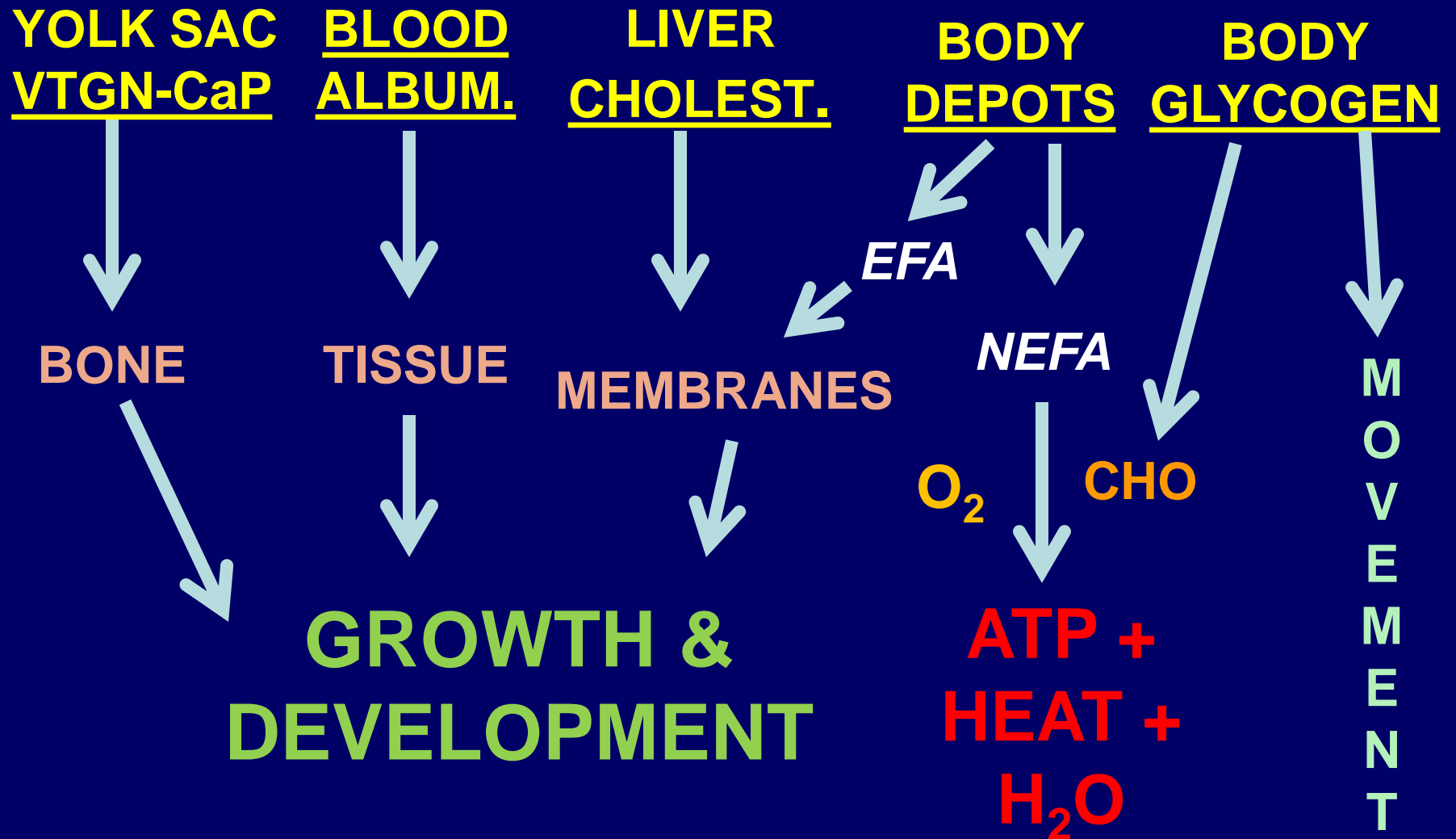
Langslow & Lewis, 1972

Liver Cholesterol



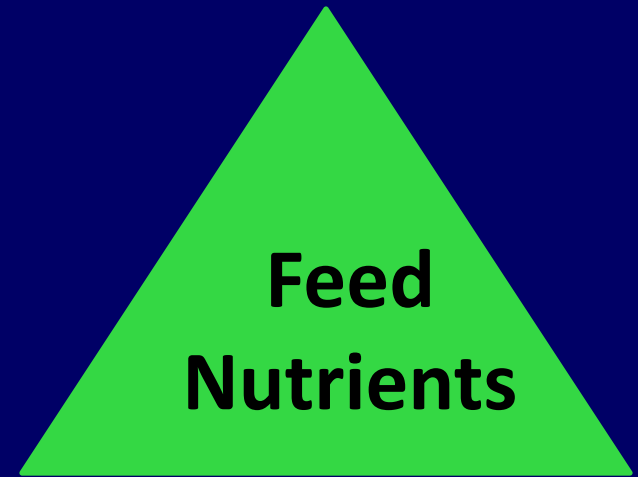
Tarugi *et al.*, 1994

PIPPING & RESERVE MOBILIZATION



MATERNAL DEPENDENCE to SELF SUFFICIENCY

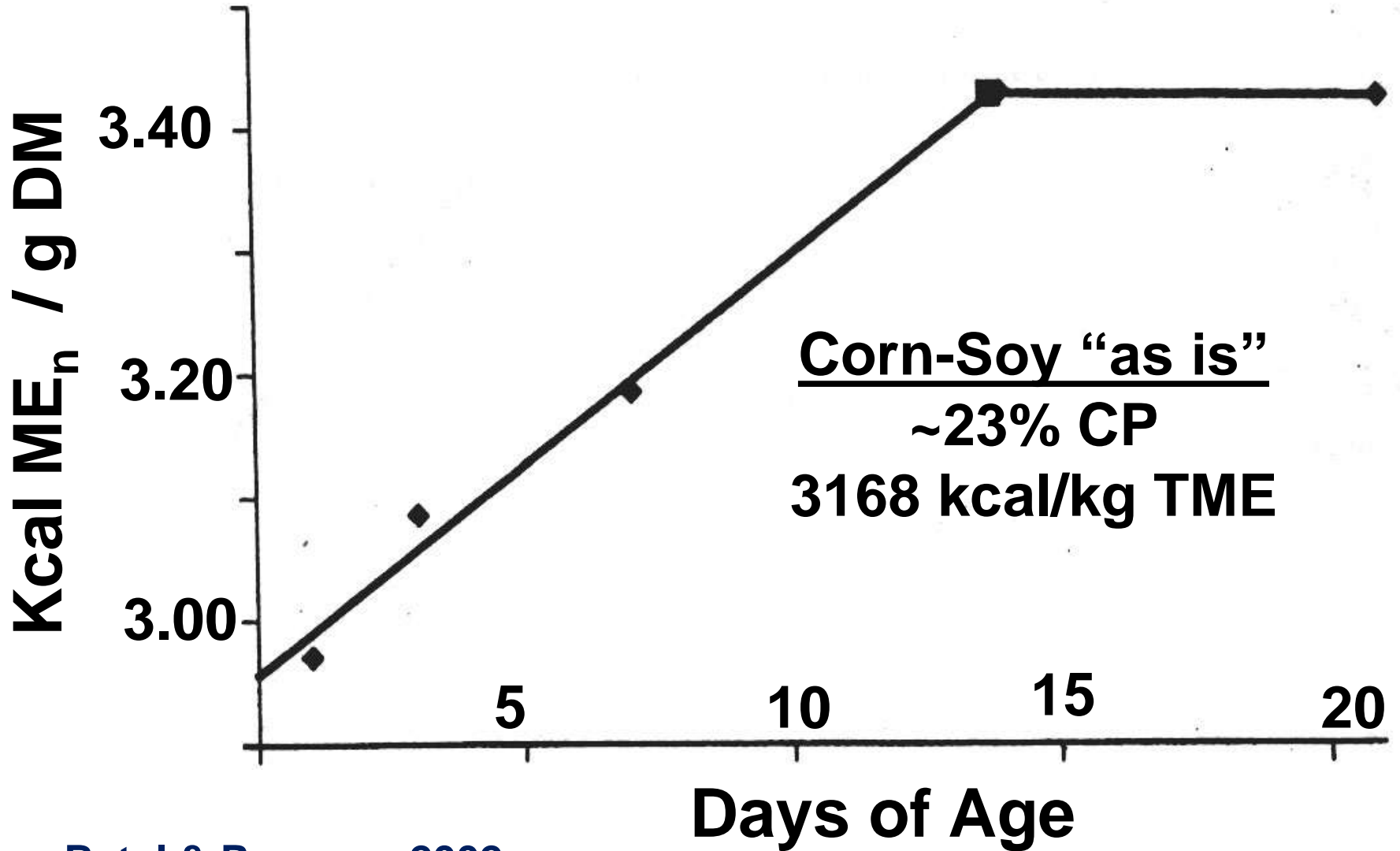
EMERGENT



3-7 Days

ESTABLISHED CHICK

POST-HATCH FEED ME RECOVERY

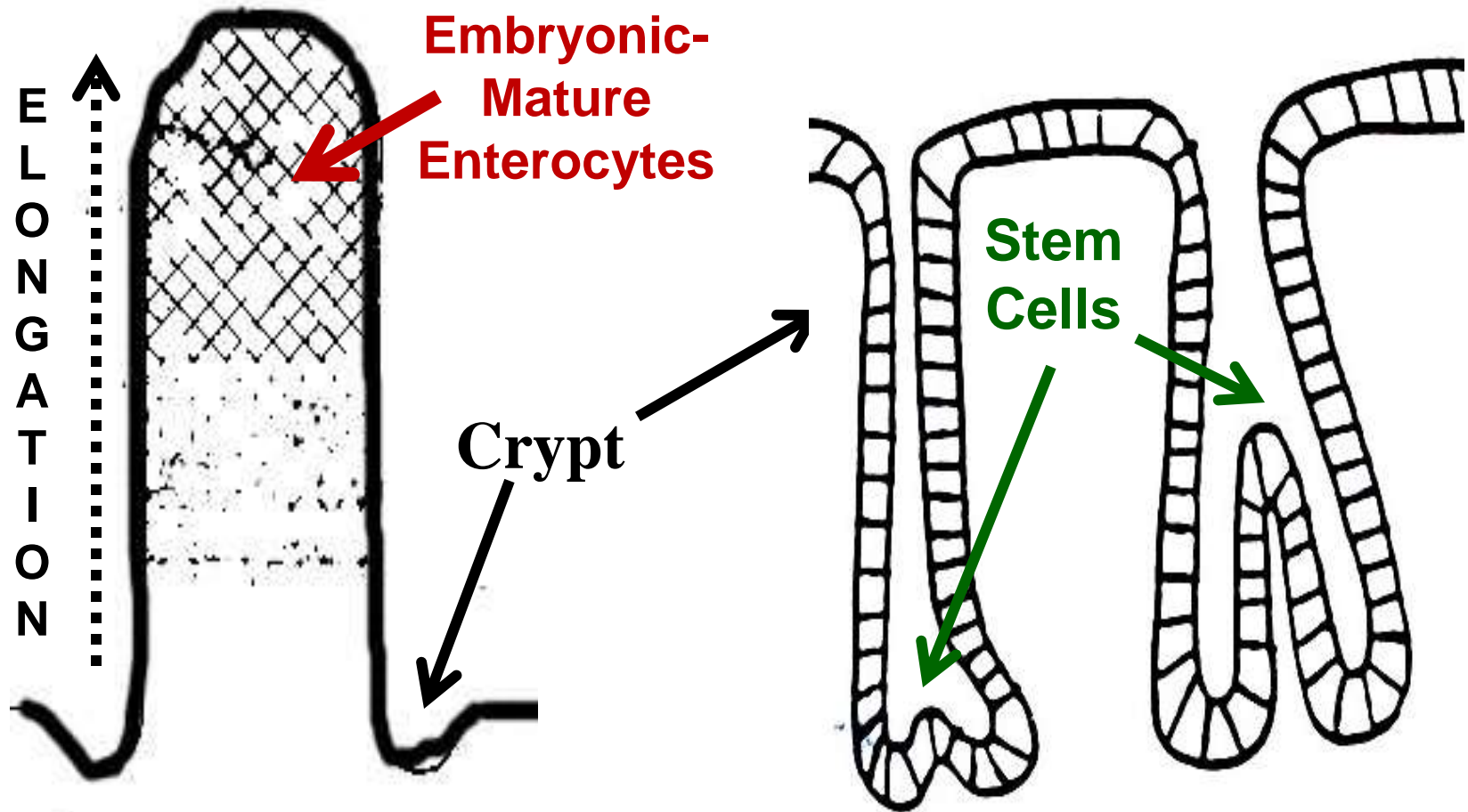


Batel & Parsons, 2002

VILLI & DIGESTIVE SURFACE

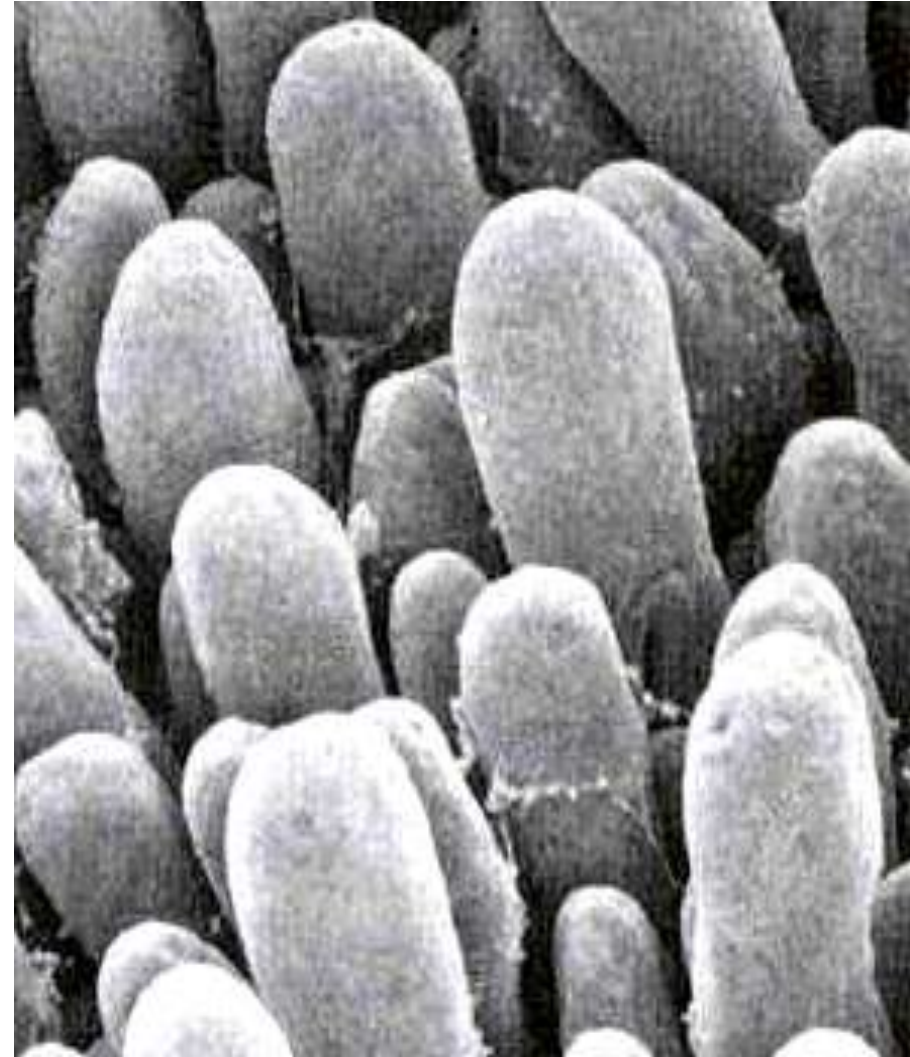
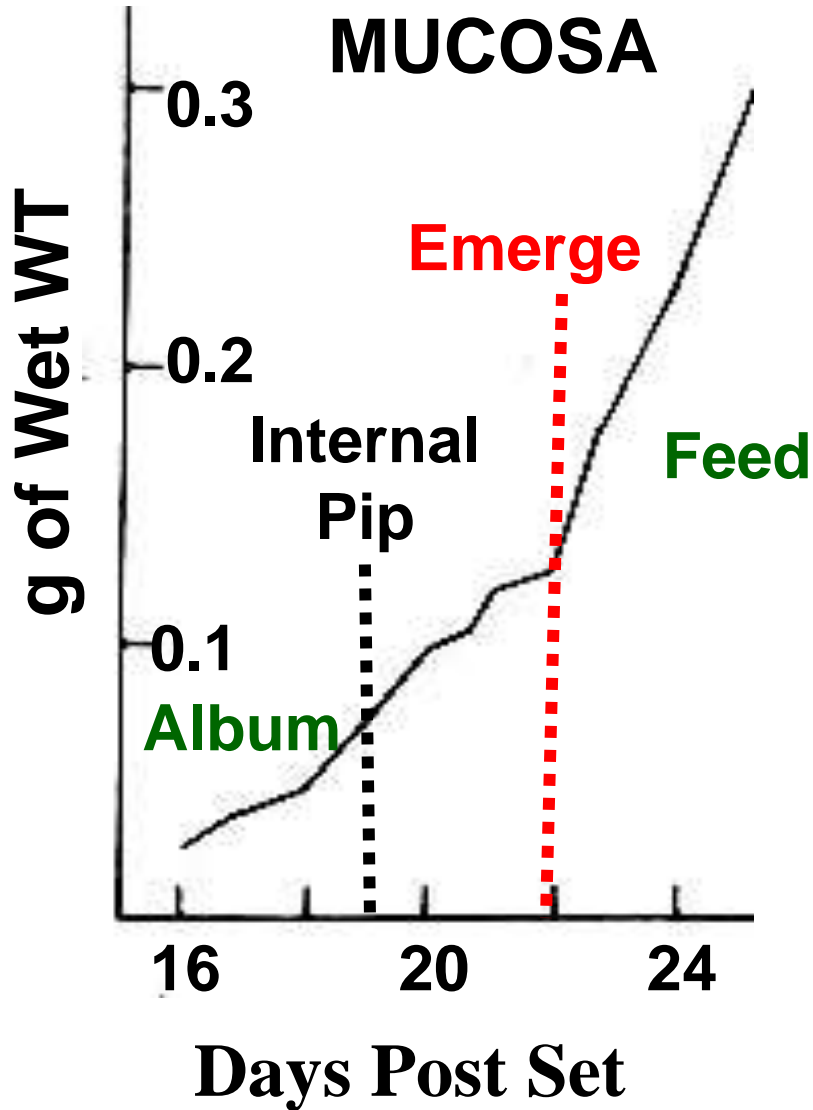
INTERNAL PIP

ADD'L DENSITY



Moran, 1985

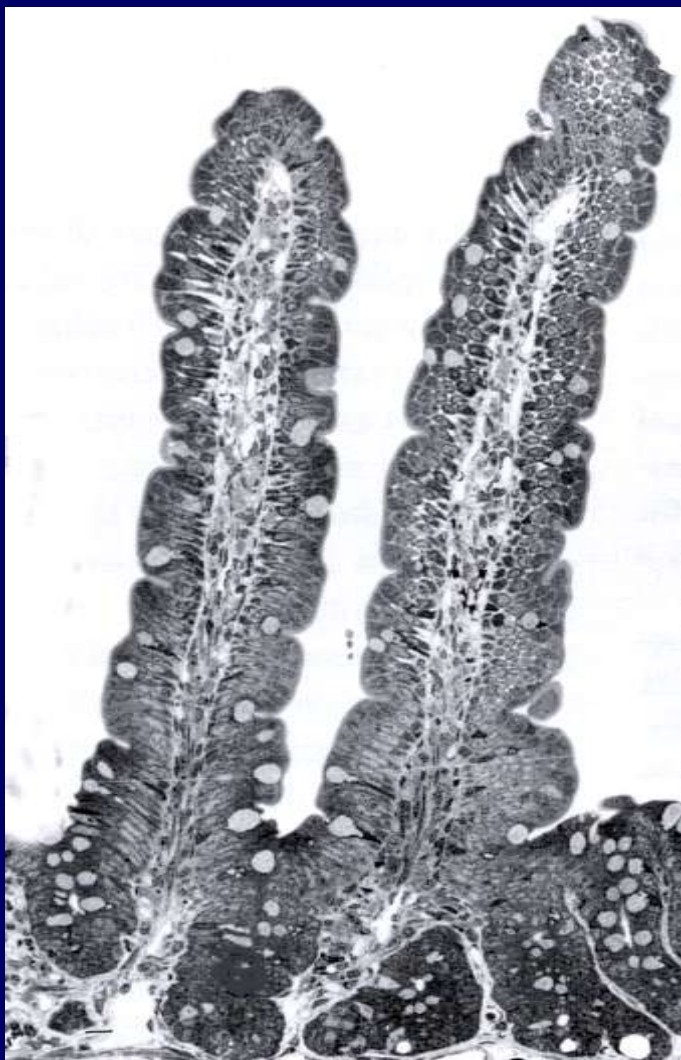
PERI-HATCH VILLI GROWTH



Post-Emergent Surface SEM

Beyer et al., 1975

VILLI SURFACE EXPANSION



MUCIN

(50-75% CHO vs AA)

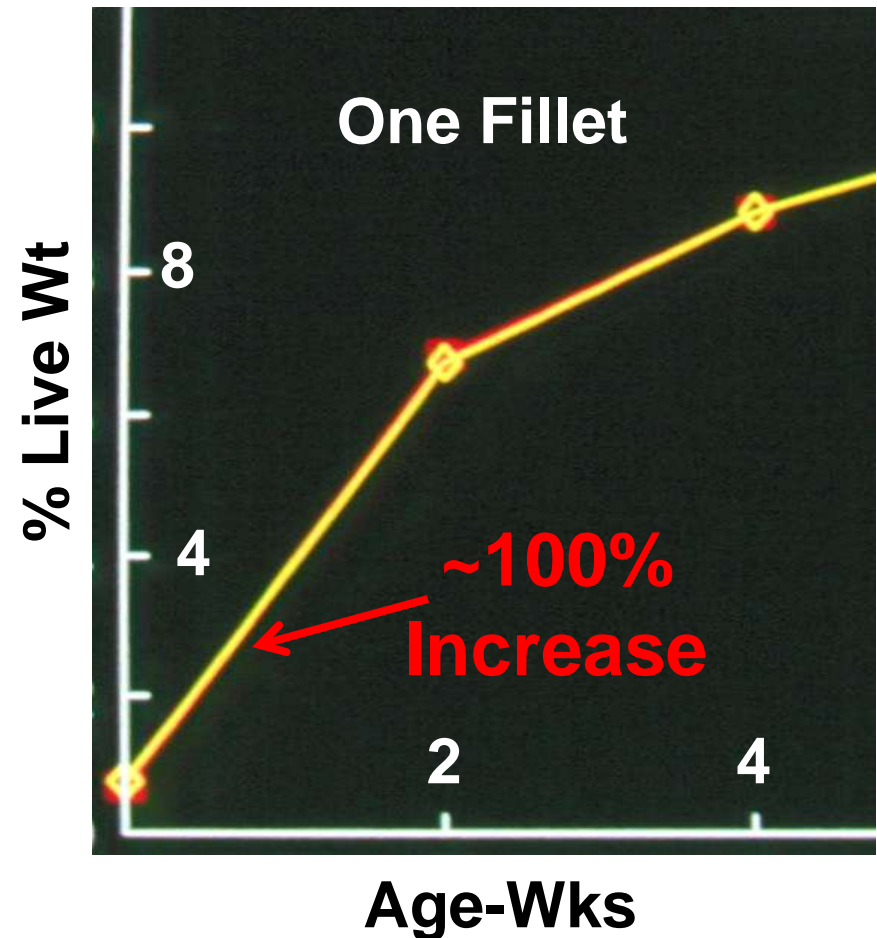
<u>AA</u>	<u>%Tot.AA</u>
Asp-Glu-Ala	29.6
Gly-Ser-Pro	22.2
Threonine	7.5
TSAA	3.4

BREAST SATELITE CELLS & MUSCLE GROWTH

Poult Rel. <u>Age</u>	<u>Peri-Hatch</u>	Sat'lit Mitotic <u>%Act.</u>
	Myofib Area μm^2	
Int. Pip	18.7	1.4
Emerge	11.3	7.8
+1D	8.6	13.7
+7D	79.8	4.7

Moore *et al.*, 2005

Broiler Male



Acar *et al.*, 1993

HEN AGE - CHICK @ HATCH

Age	Carcass		<u>% DM</u>	
<u>Wk</u>	<u>g</u>	<u>CP</u>	<u>EE</u>	<u>Ash</u>
62	44.6	45.5	15.9	5.2
27	38.6	49.2	13.5	5.1
<i>P</i> <	<i>ns</i>	***	**	<i>ns</i>

Age	Yolk Sac		<u>% DM</u>	
<u>Wk</u>	<u>g</u>	<u>CP</u>	<u>EE</u>	<u>Ash</u>
62	5.7	43.0	18.3	4.0
27	4.8	58.0	19.2	4.3
<i>P</i> <	***	**	*	*

Vieira, 1998

POST-HATCH NUTRITIONAL “CONCERNS”



- 1- EAA (Lys, Threo, TSAA, Val)**
- 2- Cond.AA (Gly-Ser, Prol)**
- 3- Phosphorus**
- 4- Essential Fatty Acids**

PRESTARTING CP FOR BROILERS*

0 – 7 D <u>CP/ME</u>	<u>g Weight</u>		<u>F/G</u>		Mort <u>%</u>
	<u>BW</u>	<u>Gain</u>	<u>Period</u>	<u>Total</u>	
0 – 7 DAYS (Expt'l Feeds)					
<i>P</i> <	***	***	*	-	<i>ns</i>
23/3.15	175	134	1.40	-	0.4
24/2.85	185	144	1.48	-	0.6
7 – 21 DAYS (23 % Prot/3.15 Kcal/g)					
<i>P</i> <	***	**	<i>ns</i>	*	<i>ns</i>
23/3.15	674	499	1.40	1.39	1.4
24/2.85	703	519	1.45	1.46	1.4

*Corn-soy Starter (2% SBOM – Fat Substitutions)- 38Wk Brdrs

Moran, Unpublished

BREEDER FEED P & CHICK

% Total Phosphorus

0.2

0.6

1.0

CHICK @ Hatch

g Body Wt.

43.4

43.2

43.5

mg P/ g Yolk Sac

9.4

9.5

9.8

µg P/ ml Plasma

34.4

36.2

38.8

TIBIA @ Hatch

Elasticity, N²

3.9

4.2

4.6

Stiffness N / cm

205

207

211

% Ash

34.0

35.1

38.5

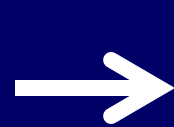
(Triuwanta *et al.*, 1992)

POST-EMERGENT DIGESTIVE SUPPORT



Hen
&
Cecal
Excreta

COPROPHAGY

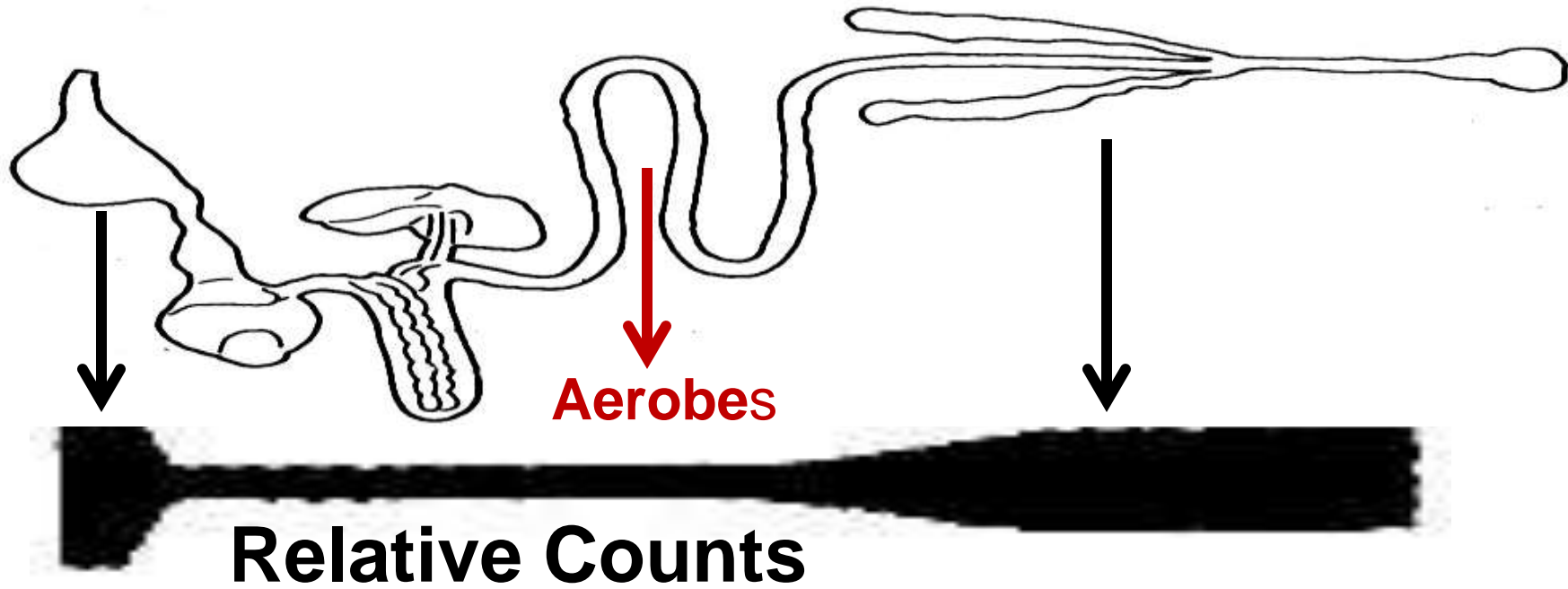


Microbe
Enzymes



Phytase
NDF'ases
CHO'ases
Proteases

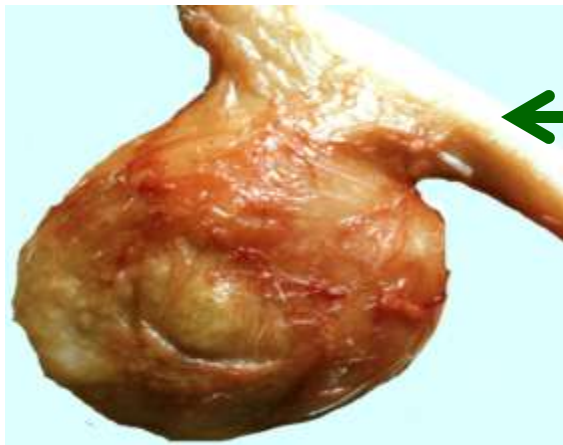
GI MICROBES POSTHATCH



CROP

CECA

Anerobes



EGG WT & FEED¹ ENZYMES, 0-3 Wk

<u>Hen Wks</u>	<u>Enz-yme²</u>	<u>Htch g</u>	<u>Gain g</u>	<u>Cons g</u>	<u>Tot. F/G</u>	<u>% Mort</u>
25	-	33	406	610	1.50	2.4
	+	33	458	568	1.25	1.2
65	-	46	506	738	1.46	1.2
	+	46	534	752	1.26	1.2
<i>Wks</i>		***	***	***	NS	NS
<i>Enzymes</i>		NS	**	NS	**	NS
<i>W X E</i>		NS	NS	*	NS	NS

¹ Moran unpubl. (Corn-Soy.= 23.1% CP, 0.45% aP, & 3.15 kcal/g)

² Comm'l phytase, amylase, xylanase and protease

FIRST FEED “THOUGHTS”

- **1- Limiting Nutrients**

- CP (EAA + Conditional & NEAA)
- Available P
- Fat (High EFA)

2- Potential Additives

- Complex Probiotics
- Multiple Enzymes

3- Requirements “Elusive”