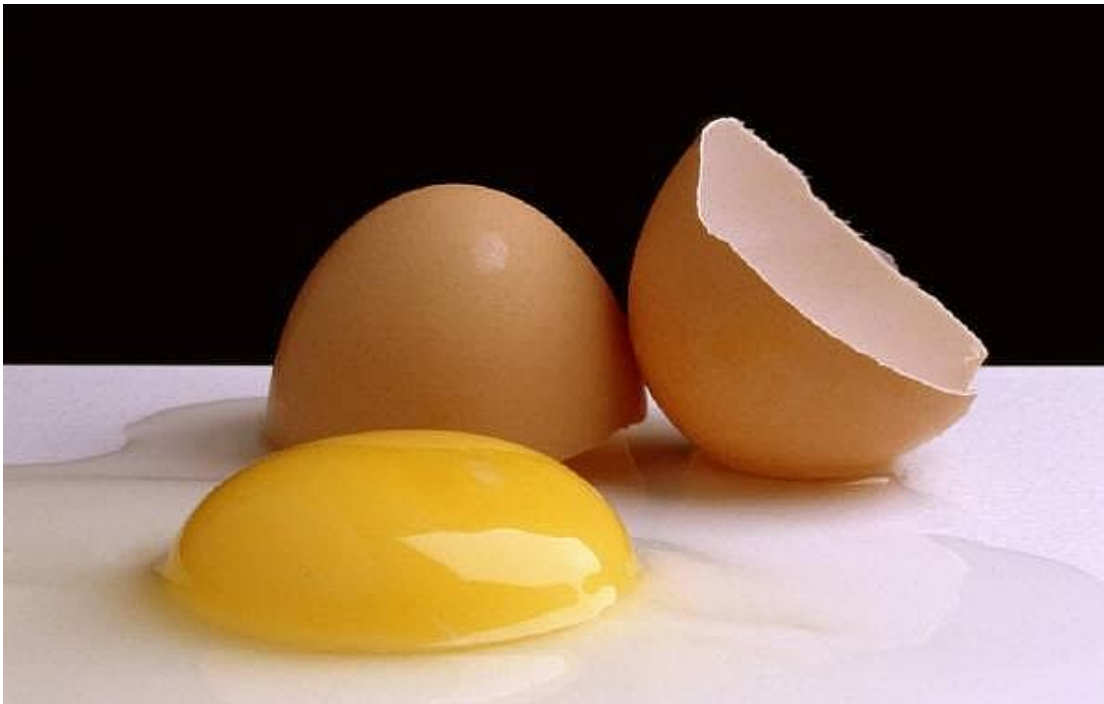


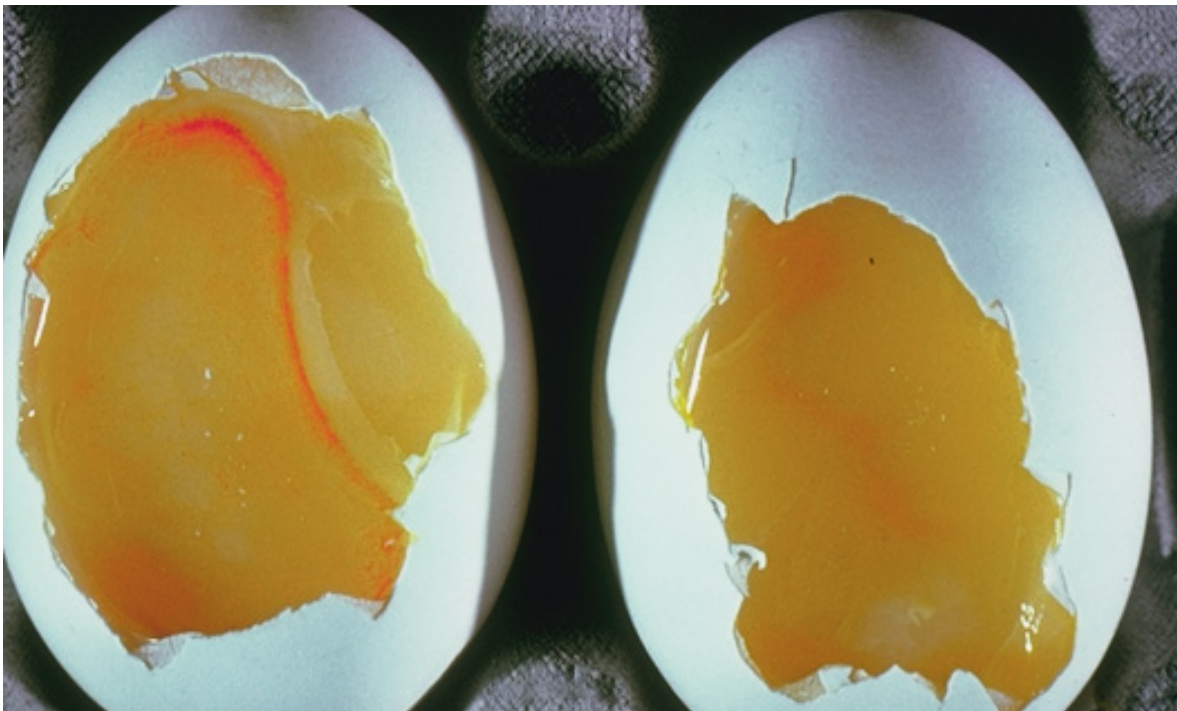
A STORY INSIDE THE SHELL

COMMENTRY

Have you ever thought what exactly are you eating, when you have an egg for breakfast? Is there a chicken in your breakfast egg? The answer is 'no'. Most of the eggs available in the shops, there is no chicken, and nothing that could grow into a chicken, for the simple reason that the usual breakfast egg is an unfertilized ovum.



The chick develops only from the fertilized egg. The male animal (cock) produces sperms. The female bird (hen) produces eggs. If mating occurs, the laid egg is called fertilized. If not it is called as an unfertilized egg.



Left : Unfertilized Egg

Right : Fertilized Egg

The egg from which the delicate embryo develops, is surrounded by a hard porous shell composed of calcium carbonate. Inside the shell is the albumen. The yolk ball is made up of concentric layers of yellow and white yolk. The nucleus is pushed to the periphery of the ovum to form the blastodisc.



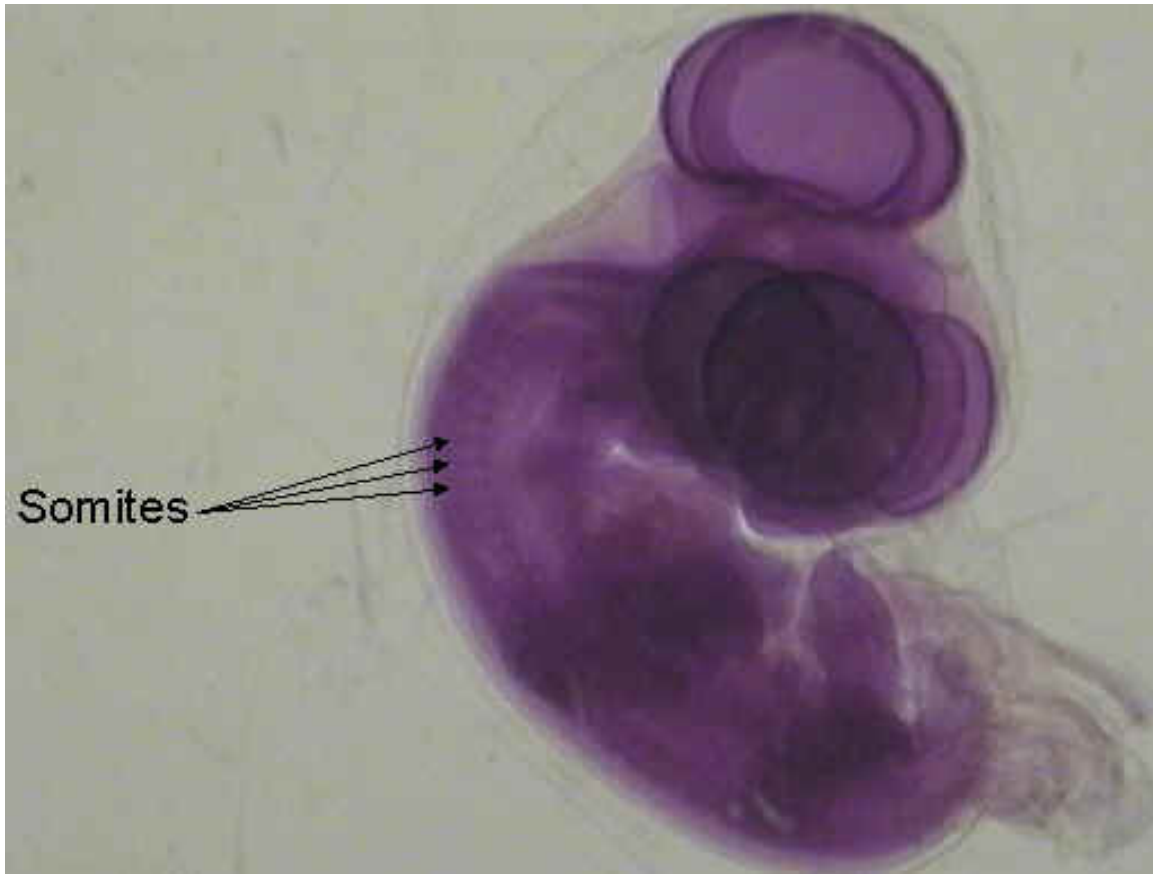
Yolk ball of an egg.

After fertilization, the ovum undergoes cleavage i.e. cell divisions, where cells i.e blastomeres keep on dividing.

The central part around the cleaving blastoderm becomes transparent. This area is known as area pellucida. The area on the outer sides of yolk is opaque and known as area opaca. Usually at this stage of development the eggs are laid by the hen.

For the developing embryo, maintenance of constant temperature and humidity are very important.

One can study the developmental stages of chick by using incubation hours, Somite number and prominent characters at each stage of development. To study the above criteria, the incubated eggs are opened carefully by breaking the shell at different intervals. The developing embryo is separated from the other layers and yolk to determine its age.



In the science of embryology, the development of an embryo within the shell is the most important aspect. The development of chick embryo inside the egg shell is a fascinating process.

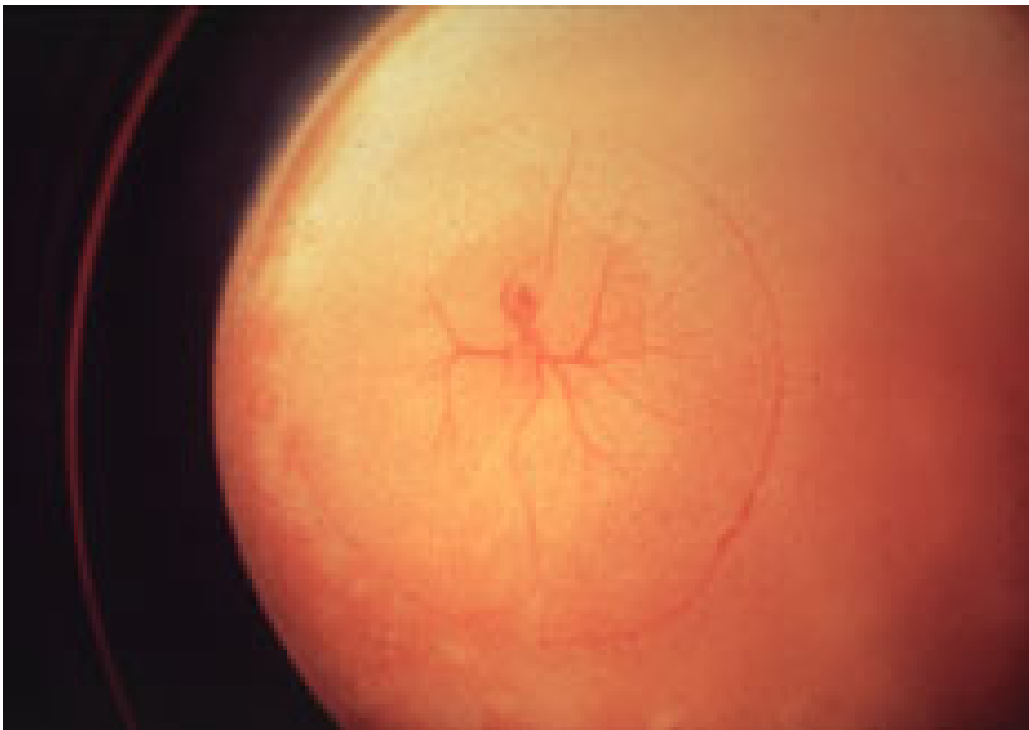
During 6-7 hours of incubation, the primitive streak is under formation. Initially it is short, thick and conical in shape. After 18-19 hours of incubation, the primitive streak reaches its

maximum length. It has the parts of the primitive pit and primitive knot.

As the development progresses, the blood islands are formed at the posterior half of the area opaca closest to the area pellucida. On 20th hour of incubation somites start appearing due to simultaneous regression of primitive streak. Every hour one pair of somites is formed, which is developed from the mesoderm. The age of an embryo can be determined after knowing the somite numbers. For example here there are 7 pairs of somites, so the embryo is of 27 hours.

In the 33 hours embryo, the paired heart tubes begin to fuse and the heart starts beating. In due course after 33 hours, the 3 brain vesicles i.e. forebrain, midbrain and hindbrain are demarcated and circulation begins between the area vasculosa and the embryo. After 36 hours. of incubation, the blood vessels are very clear and are rich with blood supply.

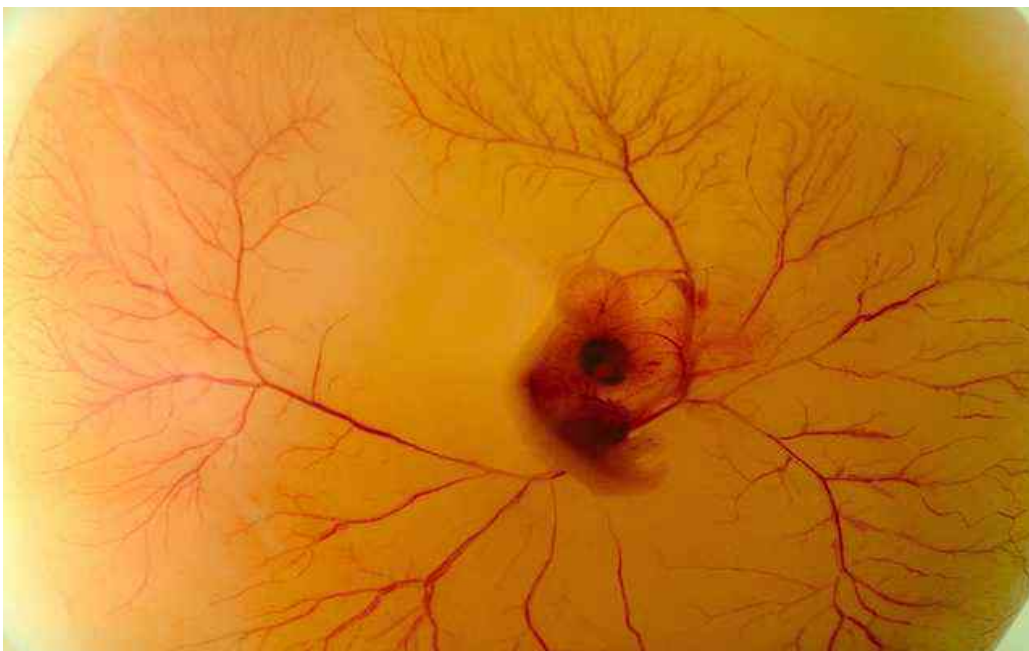
The embryo about 48 hours of incubation shows a striking difference in shape due to torsion and flexure. It bends at the midbrain region marking cranial flexure. This gives the embryo a 'P' shape. Another flexure at the posterior region of the brain that makes cervical flexure. As a result, the embryo becomes 'C' shaped. At this stage of 56 hours of incubation, the brain regions are more clear. The leg bud is flat and the tail bud is short and shows more vascular supply.



Blood-Ring

Around 72 hours of incubation, the hind-limb buds are larger than fore-limb buds. The flexures are more prominent. The allantoids are vesicular in shape. On the 4th day, the embryo is differentiated into head, trunk and tail regions. The head region has a prominent pair of eyes. The wing and leg buds are larger than wide. The tail bud is separated from the hind limb buds.

In a 6 day old embryo, occasional free movements are noted and the digits are formed. The toes are clear and separated by webs between them. The beak is clearly seen. The neck is lengthened and separates the head from other regions of the body.



At the age of 10 days, the distal segments of wing and leg are more clear and larger. Claws are found on the terminals of toes. Another important feature is the appearance of the comb primordium as a ridge along the midline of the beak. The eye-lid is also visible at this stage. The nostrils appear at the proximal end of the beak and the feather germs are clear on the limb and other areas.



Claws near the terminals.

After 10 days, further development of chick i.e. 14-18 days is based mainly on two parameters; length of the beak and the length of the 3rd toe. As the development proceeds, the two parameters elevate in length. Afterwards the average length of these parameters remain unchanged. On day 20, the body of the animal is heavier.

As the chick begins breathing the shell starts cracking.

On the 21st day, the newly hatched chick emerges into the 'New World' and makes one wonder at the delicacy and precision with which nature works.

But still Aristotle's curiosity remains unanswered "Whether the hen came first or the egg?"

* * * * *

