

Chicago Natural History Museum

FOUNDED BY MARSHALL FIELD, 1893

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REPRODUCTION IN BIRDS

BY AUSTIN L. RAND

CHIEF CURATOR OF ZOOLOGY

Living things differ from inanimate ones in being irritable, in growing, and in reproducing themselves, and the combination of these three attributes is unique. It is the third of these attributes of life, reproduction, as it takes place in birds, with which an exhibit in Boardman Conover Hall (Hall 21) is concerned.

There was a time when it was believed by everyone that "spontaneous generation" took place, that dirt bred flies, mud bred worms, cheese bred mice, and the like. Now we know this to be a fallacy, and that all life comes from pre-existing life. The torch of life is handed on from parent to offspring, from generation to generation. Its origin need not concern us here. What we are concerned with is reproduction in birds as an illustration of the basic mechanism of this transmittal.

All birds reproduce by laying eggs. It is the female, of course, that lays the eggs, but each parent (male and female) contributes a germ cell to the egg. A female bird may lay eggs, even when there has been no male bird present and no mating has taken place. This is the usual thing in poultry farms where no roosters are kept. Cage birds, parrots or canaries that have been kept alone for years, may sometimes

suddenly lay eggs, much to the astonishment of their owners. But such eggs lack the male germ cell and are infertile. They will not produce chicks.

COLOR DIFFERENCES OF SEXES

The bobwhite quail was selected to illustrate "the bird" in the exhibit. The male quail is more brightly marked than the female, as is frequently the case when the sexes are different in color, though in some species of birds the female is brighter.

Carved models illustrate the *gonads*, as the essential reproductive organs are called, and their ducts. The section dealing with the male shows the position of the reproductive organs in the body. The paired gonads or testes lie on the upper wall of the body cavity on each side of the mid-line, adjacent to the kidneys. These produce the male germ cells or spermatozoa, collectively referred to as the sperm. From the testes lead the two sperm ducts, which carry the sperm into the enlarged terminal portion of the intestines, the cloaca. From here the spermatozoa are discharged through the anus during copulation.

The exhibit includes an enlarged model of a number of spermatozoa. Each spermatozoon is composed of a head and a long tail or flagellum by means of which it swims. Spermatozoa are transferred from the male to the female at copulation, when the cloacas of the two birds are brought into contact (in some birds an organ of intromission is present). The spermatozoa swim up the oviduct of the female to meet the descending egg, and one of them fertilizes the egg.

On the opposite side of the same panel in the exhibit are the female reproductive organs. In most female birds there is but a single female gonad, or ovary. It lies on the left side of the mid-line of the body, against the kidney. Here the female germ cells or eggs ripen one by one and receive a layer of egg yolk, which is food for the embryo. The ripened egg is shed from its ruptured capsule, finds its way into the entrance of the oviduct, and starts down. In the upper part of the oviduct the egg is fertilized by a spermatozoon. Then, as it passes down this tube, the white or albumen of the egg is laid down, then the membranes, and finally in the lower part of the oviduct the shell and its color are added. The egg is then ready for laying. It is expelled from the oviduct into the cloaca, which is the common chamber where oviduct and intestines meet, and through the anus.

EGG NUMBERS VARY

The number of eggs laid by wild birds varies. There may be only one, as with some sea birds and many tropical pigeons; or there may be two eggs, as with our ruby-throated hummingbird, or a clutch of a dozen or so eggs, as with many gallinaceous birds and ducks. Sometimes if one egg is removed from the clutch during the laying

—THIS MONTH'S COVER—

The campfire scene on our cover shows Chellean Man of 250,000 years ago as he is reconstructed in one of the eight dioramas by the late Frederick Blaschke in the Museum's Hall of the Stone Age of the Old World (Hall C). The Chelleans were the earliest human beings of whom there is evidence in Europe. On page 3 Curator George Langford claims for them the world's first invention and relates how he, in the name of The Man of Chelles, formally applied to the U. S. Patent Office for recognition of this claim.

period, an additional egg may be laid to replace it. There is a record of a flicker that was thus induced to lay more than 70 eggs in a season. The domestic hen, in the course of its long period of domestication, has come to lay an egg daily over long periods.

Most of the growth of the embryo in the egg takes place after the egg is laid. The heat necessary for this growth is ordinarily supplied by the parent's body. The female usually broods the eggs. In some species the male and the female alternate, and in some rare cases the male alone may nestle down on the eggs and brood. There are a few that do not brood at all—for example, the mound builders or megapodes of the Australian area do not incubate their eggs by brooding but bury them in the ground where the soil provides the necessary heat for the embryos to develop.

Within the egg the embryo depends on the stored food, the yolk and the white of the egg. The time of development (the incubation period) varies. The young of our quail hatch in about twenty-three days. In some species, such as many of the warblers, the incubation period may be slightly less than two weeks; in others, for example certain albatrosses, it may be nearly nine weeks.

For some little time before the egg hatches, the quail chick may be heard chirping in the egg. At hatching time the bill, armed with a small transitory projection on its tip—the egg tooth—works against the shell and breaks through. The chick twists and breaks the shell until it falls apart, and the newly hatched chick lies wet and nearly helpless in the nest. Within a few hours the chick is dry and able to follow the mother quail.

Not all young birds hatch in such an advanced stage. Some are nearly helpless for a long period after hatching and need to be cared for in the nest. This aspect of the question deals with the growth of young birds and is taken up in a near-by companion screen.



Rand, Austin Loomer. 1955. "Reproduction in Birds." *Bulletin* 26(8), 2-2.

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