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Determining the Sex of Day-old Chicks

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Experiment Station, Lincoln, Nebraska
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This circular was printed originally in March, 1935. In the present edition the material on "Age for Sexing" has been rewritten, and the sections entitled "Equipment" and "Sexing Pigeons" have been added.

Determining the Sex of Day-old Chicks

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MORE than 2,000 years ago people were interested in determining the sex of the embryo in hatching eggs and the sex of day-old chicks. Aristotle thought that long eggs produced males and short eggs produced females. Pliny, several centuries later, held that long eggs produced females and short eggs produced males. Other methods, such as specific gravity and peculiarities of markings found on the large end of the eggs, have been presented, and claims made for them. As yet, however, no method of determining the sex of a fertile egg has been successful.

Ancient writings have recorded methods used in the past for determining the sex of day-old chicks. Sometimes the chick was held by the feet and the head allowed to hang down. If it turned its head up sharply, it was regarded as a female. Those that did not so behave were regarded as males. Some claimed to be able to determine the sex by noting how much struggling a chick did when suspended by the feet. Still others held that when suspended by the feet the males were not noisy, while the females did a good deal of complaining. No method of determining the sex of day-old chicks (except of course in sex-linked chicks) was of the slightest value until the Japanese method was discovered and developed.

About 1925 Japanese scientists discovered the presence of a rudimentary copulatory organ located on the ventral rim of the cloaca which was present in all day-old males and only a few day-old females. Research work done in the University of California has shown that this rudimentary organ (hereafter called the phallic knob) first appears in a six-day embryo, and is then found in both sexes. The phallic knob continues to enlarge in both sexes until about the twelfth day of incubation. At this time it commences to diminish in the females, but continues to develop in the males. Among day-old chicks from five to ten per cent of the females still have a small phallic knob, while all males have a phallic knob, but in some it is quite small. The next problem, then, was to expose it on the day-old chick without injuring the bird.

Description of the Phallic Knob

A pinhead cut off a pin and laid down would give a fairly good picture of the phallic knob in a day-old chick. The general appearance is much the same as that of a small pimple. Frequently it will appear more shiny than the surrounding parts. It will range in diameter from about one-fourth to one millimeter ($1/60$ to $1/25$ of an inch). It is normally nearly round, but occasionally found to be somewhat longer than wide, the long way always extending towards the sides of the cloaca rather than in the direction of the long axis of the chick.

Location of the Phallic Knob

Figure 1 shows the phallic knob of a six-weeks-old cockerel. This is a natural-sized photograph of a posted chicken taken in about the normal body position, with the dorsal side up. The cloacal rim has been severed at the two sides so that the lower rim of the cloaca could be turned

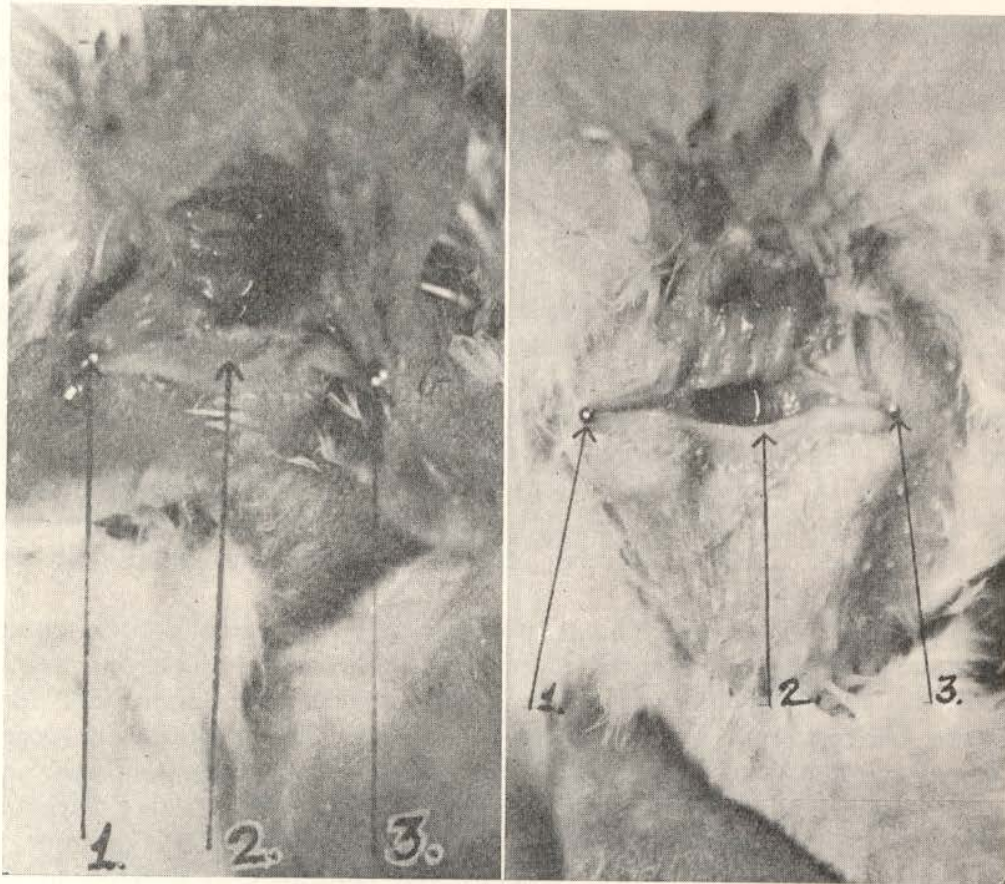


FIG. 1.—The phallic knob in a six-weeks-old cockerel. The arrow numbered 2 indicates the phallic knob.

FIG. 2.—Cloacal parts of a six-weeks-old pullet.

slightly inside out, thereby exposing the phallic knob. The arrows numbered 1 and 3 indicate the heads of pins used to fasten the cloacal parts back while the photograph was being taken. By observing Figure 1 and imagining the process of removing the pins and fitting the cut edges of the cloaca back, and turning the parts in as they would normally be in a bird, one can see that the phallic knob is on the lower rim of the cloacal opening, and situated back under the rim and half way between the two lateral parts. The arrow indicates the exact location of the phallic knob.

Figure 2 shows the cloacal parts of a six-weeks-old pullet. The arrow numbered 2 points to the spot on which the phallic knob would be located in a cockerel, but note that the rim of the cloaca is perfectly smooth.

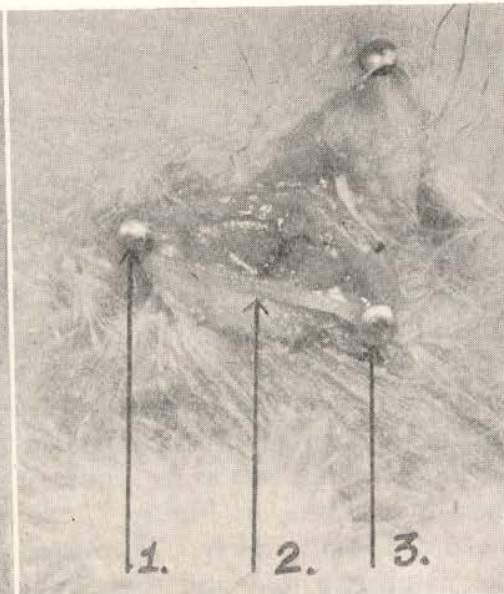
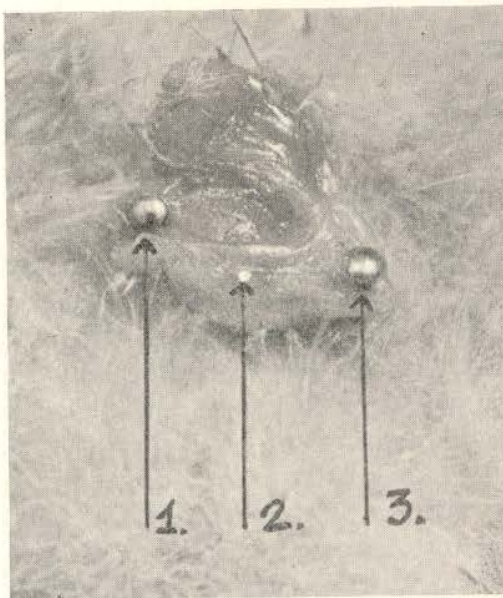


FIG. 3.—Cloacal parts of a day-old male chick. Arrow number 2 indicates the phallic knob.

FIG. 4.—Cloacal parts of a day-old female. Arrow number 2 indicates place where phallic knob would be in a male chick.

Figure 3 is a photograph of a posted day-old male chick, showing the phallic knob and surrounding structures. The chick is resting dorsal side up. The phallic knob may be seen at the end of the arrow numbered 2. It is very slightly enlarged. Compare this with Figure 4, which is a similar photograph of a day-old female. The arrow points to where the knob would appear in a male.

Age for Sexing

Until chicks are about 12 hours old, they are almost too soft and mushy to be handled easily, and after they are about 48 hours old, the cloacal parts become too firm and too set to be readily manipulated. Hence the best age for sexing chicks is from about 12 to 24 hours. At that age it will not only be easier to expose the phallic knob but it will put less strain and pressure on the chicks.

Equipment

A strong, soft, blue light will make the job of sexing much easier. A minimum illumination of 100 watts should be used and stronger illumination, up to 200 watts, is recommended.

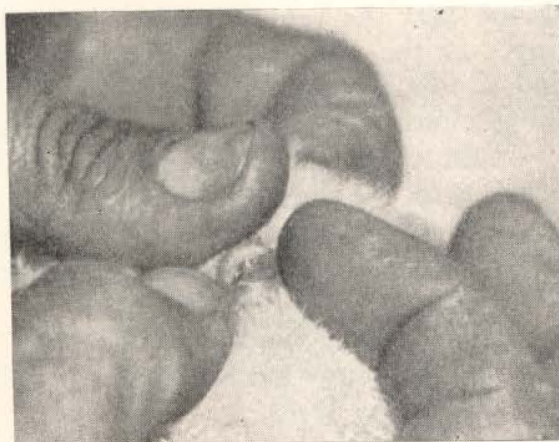


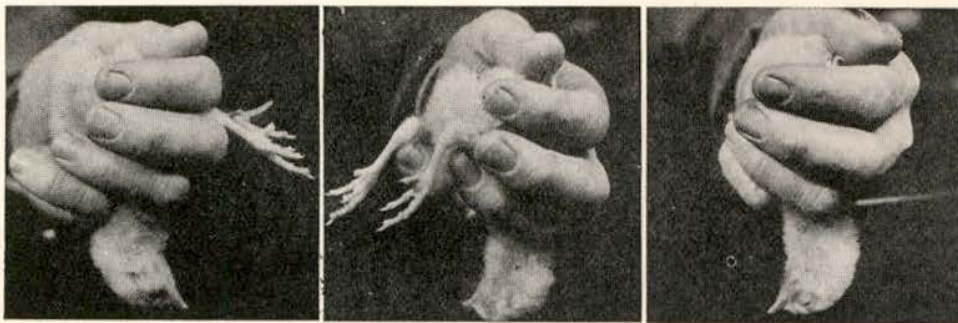
FIG. 5.—The general relation of the finger and two thumbs to the cloacal parts.

Magnifying glasses that increase the diameter of the phallic knob about two to three times will reduce the amount of eye strain and improve one's accuracy.

A binocular loupe that will serve the purpose may be purchased through any jewelry store.

How to Hold the Chick

There are a number of satisfactory ways of holding the chick. (All of the following descriptions will be for right handed folks; left-handed persons will have to reverse them.) One may hold the chick in the left hand with ventral surface to the palm, head down, and feet extending between the index and middle fingers as shown in Figure 6, or one may hold the chick in the left hand, dorsal surface to the palm of the hand, head down, and feet dangling free as in Figure 7, or he may hold them as in Figure 8, which is the same as Figure 7, except that the legs are inside the hand instead of hanging freely. The operator must discover a method that seems most natural to him and that induces the least amount of struggle and resistance on the part of the chick.



FIGS. 6, 7, 8 (left to right).—Methods of holding the chick.

Exposure of the Phallic Knob

If one is holding the chick as shown in Figure 6, he places the left thumb near the ventral side of the cloaca to assist the thumb and index finger of the right hand, which are placed on either side of the cloaca and a little toward the dorsal aspect. Under no conditions should anything more than gentle pressure be exerted.

If the chick is held as indicated in Figures 7 or 8, the left thumb is placed near the dorsal part of the cloaca with the thumb and index fingers of the right on either side, and a little toward the ventral aspect. It will be necessary to indulge in considerable practice before the fingers and thumbs become able to coordinate in such a way as to roll back the lower rim and expose the phallic knob. If one practices on older chicks until his technique has developed, it will then be less difficult to learn to sex the younger birds.

Does Exposing the Phallic Knob Injure the Chicks?

A day-old chick has very tender skin and membranes. If one is not reasonably careful, he will in the process of sexing break some of the internal membranes. This in most cases will cause the chick to die in a few days. If one is reasonably careful, and has a good technique developed, he will not injure more than one or two chicks in several hundred.

Accuracy to be Expected

The buyer of sexed chicks should not expect an accuracy of more than 90 per cent. About 95 per cent of the cockerels have well-developed phallic knobs, and about 95 per cent of the pullets have no phallic knob. The remaining five per cent of the cockerels and the five per cent of pullets have small or otherwise poorly developed phallic knobs. It is this ten per cent that cause most of the confusion. However, the experience of sexing several thousand chicks at the University of Nebraska College of Agriculture warrants the definite conclusion that an accuracy of from 90 to 95 per cent may be realized.

Economic Value of Segregating the Sexes of Day-old Chicks

In many cases poultry raisers do not have brooder house space to raise enough pullets to fill the laying house if they house both sexes. By buying only pullets sufficient numbers may be raised to fill the laying houses. For a broiler business the cockerels are more desirable than the pullets. They will reach a two-pound size in from one to two weeks less time than the pullets, and in many cases are preferred by the poultry buyers.

Specialty breeders sometimes wish to retain one sex and have a good sale for the other. In some sections of the country, the cockerels of certain breeds are a drug on the market, and scarcely pay for the feed they eat. So rather than attempt to raise the cockerels to a marketable age, they are segregated and gassed.

Sexing Pigeons

An examination of adult pigeons has failed to show a phallic knob. It is barely possible that squabs have this structure when hatched, and that it is subsequently resorbed. Further investigation of this problem is contemplated.