grabs the female by the neck hackle or comb. This last pattern is sometimes followed by: (5) The complete copulatory behavior. In general, birds of Class 4 seldom went beyond Stage 1. Birds of Class 3 seldom went beyond Stage 3. Birds of Class 2 commonly performed Action 4. Birds of Class 1 copulated occasionally. Fertile copulations were found only in some Class 1 individuals. The behavior of the intersexual birds with the dummy showed identical patterns but in general was on a lower level of activity, probably due to the lack of motion on the part of the dummy.

Summary. The behavior of intersexual male domestic fowl shows gradations from essentially normal masculine copulatory patterns to neutral or inactive behavior, coinciding in general with the degree of masculinity of plumage.

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The Sexual Behavior of Hormonally Treated Domestic Fowl.*

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The stereotypy of avian behavior patterns makes birds excellent experimental material for a study of the factors influencing behavior. Some of these factors can be segregated by the injection of appropriate hormones into normal and castrate individuals.

In order to analyze the relation of certain endocrines to sexual behavior patterns, a series of experiments was undertaken on domestic fowl of the Brown Leghorn variety. Normal roosters, capons, and sinistrally and bilaterally ovariectomized poulards were used in our experiments. In the present series, capons and bilaterally ovariectomized poulards were injected daily with testosterone propionate and estradiol (progynon-B), sinistrally ovariectomized poulards were injected with testosterone, and normal roosters received stilbestrol. The behavior of these individuals was tested, generally on alternate days, in the following manner: Each experimental bird, alone in his own pen, was introduced at suitable inter-

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vals to a normal female, to a normal rooster, or to a stuffed female which was mounted in the squatting, copulatory position.

Two capons receiving 2.50 and 3.75 mg testosterone daily, copulated, crowed, and waltzed within 2 weeks. A third very nervous capon, receiving 1.25 mg, never copulated. Similarly, 3 capons receiving .50, 1.00, and 1.50 mg estradiol daily, copulated in 18 days. Another series receiving 1.00, 1.50, and 2.00 mg estradiol copulated within a week. Two capons receiving 1.50 and 2.00 mg stilbestrol copulated. A third very nervous bird, receiving 1.00 mg, never copulated. However, in contrast with the effects of testosterone, the estrogen-injected birds were not known to crow, and rarely "tidbitted"† or "waltzed". Furthermore, the vigor of these estradiol-injected birds, as revealed in copulation and general activity, was greatly reduced. The "tidbit" is considered a substitute activity frequently observed when the rooster is frustrated. Two normal roosters, receiving 2.5 and 5.0 mg stilbestrol, stopped crowing by the tenth day but continued to copulate, although in a listless manner, throughout the 46 days of the experiment. One of them waltzed and tidbitted listlessly a few times during the last week. The other bird was not observed to waltz or tidbit after 10 days of injection. Postmortem revealed tremendously reduced testes whose weight per bird was 75 and 110 g. Stilbestrol and estradiol both brought about normal feminization of growing feathers. The estrogenized capons show hypertrophy of the cloaca approximating that of the laying hen.

Three bilaterally and three sinistrally ovariectomized poulards receiving 1.25, 2.50, and 3.75 mg testosterone, crowed and waltzed within 21 days. However, these poulards never copulated with a normal female or the dummy during the 89 days of injections. Instead they violently pecked the normal female and the dummy. Similarly, the sinistrally ovariectomized poulards, known to possess left ovotestis, became more aggressive following injections of testosterone propionate. They showed a greater frequency of crowing and waltzing but never copulated. Two bilaterally ovariectomized poulards receiving .50 and 1.00 mg estradiol became lethargic and ignored the dummy and other females in all tests. One individual on the 18th day of injection squatted for the normal rooster and received copulation. A second bilaterally ovariectomized individual reacted similarly on the 42nd day, receiving the male in a normal manner. The third bird receiving 1.50 mg did not squat.

Summary. Both androgen and estrogen, injected into capons,

† "Tidbit" is used as a shorthand term for calling the hen to share a real or imaginary morsel.

induced the masculine copulatory behavior but only androgen induced crowing and increased or induced the "tidbitting" and "waltzing". In bilaterally ovariectomized poulards, androgen induced crowing and waltzing but did not induce the masculine copulatory behavior while estrogen, on the contrary, induced the feminine squatting behavior. These results would seem to suggest that certain behavior patterns are common to both sexes of the fowl and may be induced by the appropriate hormone. . The masculine copulatory behavior can be induced by both androgen and estrogen but only in genetically determined males.

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Toxicity of Intravenous Paraldehyde.

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Intravenous paraldehyde for anesthesia of short duration has been advocated frequently by clinicians.[1-4] The rapid induction and quick recovery following its use have been factors in formulating the impression that it is without toxic effects. The numerous clinical reports contrast sharply with the paucity of experimental investigations, and this stimulated a study to determine the safety of intravenous paraldehyde administration in experimental animals. In accordance with the regularly recommended clinical practice the drug was injected intravenously undiluted, at the rate of 0.5 cc per second.

Thirty cats, 20 dogs and 20 rabbits were used.

The Minimum Anesthetic Dose (smallest dose that produced anesthesia) was found to be 0.3 cc per kilo body weight in all 3 species. The Minimum Lethal Dose (dose at which 50% of the animals died) was found to be 0.45 cc per kilo (cats, rabbits) and 0.50 cc per kilo (dogs). These figures demonstrate a margin of safety of low order.

Autopsy findings in the animals given lethal doses were similar.

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