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auch hier intermediäre Vererbung herrscht, wie bei allen Art- und Varietätenkreuzungen.

So sind auch die neuesten Versuche, die intermediäre Vererbung mendelistisch aufzulösen, missglückt, haben ihre Existenz vielmehr an einem großen Material von neuem bewiesen. (Schluss folgt.)

A "Disharmony" in the Reproductive Habits of the Wild Duck (Anas boschas, L.). By Julian S. Huxley, Balliol College, Oxford.

The following facts concerning the behaviour of the Mallard afford a very striking and indeed surprising example, in a wild species and under natural conditions, of what Metschnikoff has taught us to call a Disharmony — a lack of adaptation leading to harmful results for the species; and, since these facts appear not to be widely known, I venture to record them here.

They are as follows: The Wild Duck is monogamous, and the drake or Mallard, though as a rule he neither feeds the sitting female nor helps to bring up the young, yet manifests considerable attachment to his mate. During the time of incubation, the drakes are usually said to take no interest in the ducks, and, congregating into bands, to lead a lazy bachelor existence. This is only partially true; the males do congregate in such bands, but only for part of the time. At intervals the drake returns to the neighbourhood of his sitting mate, stayng there often for hours together. This he will do even if she has built at a long distance from the water. When a duck is put up off her nest, her drake will often be seen to fly up and join her in the air.

So far all is normal and decent. Now comes the disharmony. When a duck flies off her nest, it is often not only her own mate that flies up to join her; other drakes (I believe including those that are resting near their own ducks as well as the temporary bachelors) may fly up from all sides, and set off in pursuit. In April it is a very common sight to see from two to ten drakes thus chasing a single duck, and occasionally there will be many more. She doubles and turns, but, being smaller in size than the drakes, can never escape from them by speed alone. How then do these polyandrous pursuits end? Sometimes the drakes get tired of the chase while still in mid-air, and one by one drop down. If this does not happen, and the duck has at length to come down on the water, there may still be no particular sequal — only a good deal of excited quacking and swimming about and mild fighting — the real husband being finally left alone with his mate. But sometimes, especially when the drakes are very numerous, they regularly mob the single duck, and at last one will succeed in treading her. As this act takes place in the water, it is apparently somewhat unpleasant and also tiring to the female, who has to struggle all the time to keep her head above the surface. When the first drake has completed the process, the duck is rather exhausted and cannot so easily prevent a second from pairing with her. So it goes on — until eventually the duck is drowned.

This was told me by Mr. James Street, Head Keeper at the Tring Reservoirs. He added that every year about 70 females were picked up drowned by the keepers there and that no doubt a considerable further number were not found. There are about 1000 to 1200 pairs of Wild Duck on the Reservoirs in spring; suppose we put the total of birds thus killed at 80 to 100 (i. e. allowing only 10-30 to escape detection by the keepers). Then from 7 to $10^{0}/_{0}$ of the total number of females are killed by the males in this way every year.

At first I hardly liked to believe these statements, although Mr. Street's word, I knew, was a sufficient guarantee; but I soon had ocular demonstration of their truth. In the first place, I saw numerous wild duck dead in the water, and these were all females: on one day I counted 11 along one side of a single one of the four reservoirs. In the second place, I once witnessed the process in operation. Near the shore of one reservoir I noticed a dense crowd of drakes swimming excitedly about, all quacking at the top of their voices; through the glass I made out a single duck, which one of the drakes was treading. Remembering what the keeper had told me, I ran up and scared them into flight by shouting. This, however, was of no use; the drakes kept all round the duck; when she settled they all settled too, and the treading began again, now uninfluenced by shouts and out of reach of stones. It was a painful and repulsive sight. The duck was getting rapidly enfeebled; after one drake had finished the act of treading (which often takes a considerable time to accomplish to his satisfaction), the duck was left floating low and rather limply on the surface, only to fall a victim almost immediately to the instincts of another male. At last she could scarcely struggle; and finally, becoming quite exhausted, would at times disappear under water for a considerable space. Every time she came up, however, another drake swam to her; but finally (though they persisted in trying) they could not tread her properly, as she offered no resistance, and so at once disappeared below the surface when they put their weight on her back. I at last thought she was drowned, as she was out of sight for so long; but finally her head and neck and just the top of her back floated up (I can use no other word) some fifteen yards away. This time no drake happened to notice her, and she thus succeeded in swimming

slowly to the shore, where she hid under an overhanging bush. If treading had gone on much longer, she would undoubtedly have been drowned.

To sum up: in the Wild Duck the time during which the males possess the sexual instinct is extended through the period of incubation. While the female is actually on the nest, this instinct cannot be satisfied; hence when a female leaves her nest she is often pursued by a number of unsatisfied males. Since in the Duck family copulation takes place in the water, this pursuit of one female by many males may end in the death of the female by drowning. At Tring Reservoirs a considerable number (probably $7-10^{\circ}/_{\circ}$) of the females are killed in this way every year. Even if we take the percentage at half the probable figures, the loss to the species is very considerable, and this loss is caused by a property of the species.

Similar fatal results arising from similar disharmonies of the reproductive system are recorded of other species (cf. Judges, XIX, 25).

Die mikroskopische Strahlenstichmethode, eine Zelloperationsmethode.

Von Dr. Sergeï Tschachotin.

(Vorläufige Mitteilung.)

(Aus der parasitologischen Abteilung [Vorstand: Prof. Dr. Th. v. Wasielewski] des Instituts für Krebsforschung in Heidelberg, Direktor: Prof. Dr. V. Czerny, Exz., und aus dem pharmakologischen Institut der Universität Genua, Vorstand: Prof. Dr. A. Benedicenti.)

Manche Gründe bewegen mich, einer Serie von Arbeiten, die noch nicht ganz abgeschlossen sind, diese vorläufige Mitteilung voranzuschicken.

Den Anstoß zu den zu erwähnenden Untersuchungen gab die sich allmählich immer dringender einstellende Überzeugung, dass wir unsere erfolgreiche experimentelle Methodik, die in den letzten Jahrzehnten zu einem ungeahnten Fortschritt auf allen Gebieten der biologischen Forschung geführt hat, dimensional verfeinern und auf die kleinsten materiellen Einheiten des Lebens, auf die Zelle als Individuum, auszudehnen versuchen müssten.

Wie wir beim Experiment in größerem Maßstabe praktischmethodisch einen eingreifenden und einen registrierenden, beobachtenden Teil unterscheiden, so würde auch beim Mikroexperiment unser Augenmerk auf die Ausarbeitung erstens der Mikroläsionsund zweitens der Mikroobservationstechnik zu richten sein. Letztere kann bekanntlich subjektiv und objektiv (z. B. Mikrophotographie

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