

Chickens also orientate themselves by the Earth's magnetic field

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40 years ago, Prof. Dr. Wolfgang Wiltschko was the first to prove that migrating robins use the Earth's magnetic field to direct themselves during migration. Their magnetic sensor showed them the course of the field lines of the Earth's magnetic field.

This produces an inclination compass that reacts to the inclination of the Earth's magnetic field to the surface of the Earth, thus distinguishing between "pole-wards" (the side on which the field lines incline downwards) and "equator-wards" (the side on which they incline upwards). The inbuilt compass is additionally finely tuned to the field strength of the Earth's local magnetic field, but can also be flexibly adapted to other field strengths that the birds encounter in the course of migration.

Since that time a compass of this kind has been found in more than 20 species of birds, the majority of them being those songbirds that undertake annual migration.

An international working group under the direction of Wolfgang und Roswitha Wiltschko of Frankfurt University has now succeeded in demonstrating the presence of a magnetic sense of direction in domestic chickens as well.

For this purpose, newly hatched chicks were imprinted on a red ball which they from then on regarded as their 'mother'. The researchers then hid the ball behind one of four screens, and taught the chickens by

intensive training that the mother was always behind the screen that was in the northerly direction.

To demonstrate that the chicken senses this compass point by means of its magnetic sense of direction, the researchers set up an artificial magnetic field in an easterly direction – and the chickens did actually seek their mother behind the screen that lay to the east.

Further experiments showed that the chickens' magnetic sensor functions very similarly to that of the robin. It also reacts to the inclination and the local field strength of the Earth's magnetic field. The magnetic sensor is probably situated in the eye, since the birds need short-wave light (such as blue light) to orientate themselves. In long-wave light above the yellow level this ability is lost in all the birds that have so far been tested. From these similarities the research group has deduced that a magnetic sense of direction could be an ability common to all birds.

Since one has to go back very far in evolutionary history to find a common ancestor for chickens and robins, this ability must have developed before the birds began to migrate. Accordingly it seems that the magnetic sense of direction was already used by primitive bird-forms to move efficiently in their environment between their nests, sleeping places, and sources of food and water.

Source: Johann Wolfgang Goethe-Universität Frankfurt

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