Chicken eyes: New state of matter
Ojos de pollo: nuevo estado de la materia

Dear Sir:

Matter has three states or forms of aggregation: solid, liquid and gaseous. When referring to matter and its states, we imagine quantum physicists, chemists and engineers in big laboratories or in particle accelerators to which basic researchers have little or no access. The least we could imagine is physicists describing a new state of matter in the eyes of a common chicken and, what is even more amazing is that it is the first time this order is observed in a biological system. For years, ophthalmologists have used chicken eyes as an animal model in the study of illnesses as important as refractive ones, particularly myopia, studying their physiology and anatomy, but the new state of matter known as “disordered hyperuniformity” had not been described until many physicists from different U.S. universities (Princeton University and Washington University in St. Louis) had observed the distribution of the five types of cones in chicken retina. Previously, it had only been observed in physical systems such as liquid helium and simple plasma.

Chickens (active birds during daytime) have four cones susceptible to certain wavelengths (violet, blue, green and red) and a fifth one to detect light levels. Additionally, each type of cone has a different size. Cones arranged in this way seem to have a totally chaotic and disorganised layout, but it is observed that each cone has an exclusion region that avoids contact with other cones and each type of cone has a different exclusion region. Each type of cone is in different layers, one on top of the other, which gives a disorder aspect, but each layer is perfectly organised: this is called “disordered hyperuniformity”, which allows it to behave like crystal or liquid.2,4 The advantage of this distribution is that chickens are able to capture light in a more uniform way. With computer models that simulate cone distribution in chicken retina, disordered hyperuniform materials are obtained, which have unique properties when it comes to transmitting and controlling light waves: they are able to transmit light with the efficiency of a crystal and the flexibility of a liquid; this may have an important biotechnological application.

REFERENCES


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Post-operative endophthalmitis due to Candida parapsilosis
Endoftalmitis postoperatoria por Candida parapsilosis

Dear Editor:

This is the case of a 65-year-old female patient on treatment for diabetes and hypertension, who underwent surgery in May at an eye centre for cataract surgery, with no complications whatsoever. One month later, the patient visited the centre due to a clinical picture of corneal oedema, with hypopyon and vitreous Tyndall in the anterior chamber, which led to the diagnosis of endophthalmitis; therefore, medical treatment was prescribed. Given patient’s poor progress, a pars plana vitrectomy was performed in September, where the presence of deposits at the lens and capsular bag level was confirmed.

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