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Human ophtalmomyiasis caused by *Oestrus ovis* (Diptera: Oestridae): a case report from North Eastern Anatolia (Artvin, Türkiye)

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Abstract. Ophthalmomyiasis is known as the infestation of the conjunctival surface with Diptera larvae. The condition is known as ophthalmomyiasis externa or ophthalmomyiasis interna according to the region where the larvae settle on the conjunctival tissue. *Oestrus ovis* (Diptera: Oestridae) is one of the most common causes of ophthalmomyiasis in humans. The species is widely reported in both ruminants such as sheep and goats (nasal cavities, frontal, and maxillary sinuses) and humans (conjunctival surface, throat, nose, and ears), especially during the warm seasons of the year, in countries from the Mediterranean basin is located. Infected small ruminants may exhibit difficulty breathing, sneezing, mucopurulent discharge, and neurological symptoms in infested animals, symptoms such as hyperemia, itching, pain, keratitis, and lacrimation in infested humans. The material of this study consists of Diptera larvae collected from the right eye of a 20-year-old male patient who applied to the Emergency Clinic of State Hospital (Borçka, Artvin) in July. The collected larvae (n= 6) were preserved in 70% ethanol, then identified as first instar larvae of *Oestrus ovis* in the light of the relevant literature under a light microscope. This paper aims to report a case of ophthalmomyiasis caused by *O. ovis* from the North East of Türkiye, and to contribute to the phenological studies of this species with zoonotic importance.

Keywords: Arthropod infestations; *Oestrus ovis*; ophthalmomyiasis.

Oftalmomiaza umană cauzată de *Oestrus ovis* (Diptera: Oestridae): raport de caz din Anatolia de Nord-Est (Artvin, Türkiye)

Rezumat: Oftalmomiaza este cunoscută ca infestarea suprafeței conjunctivale cu larve de Diptera. Afecțiunea este cunoscută sub denumirea de oftalmomiaza externă sau oftalmomiaza internă în funcție de regiunea în care larvele se instalează pe țesutul conjunctival. *Oestrus ovis* (Diptera: Oestridae) este una

dintre cele mai frecvente cauze ale oftalmomiazei la om. Specia este raportată pe scară largă atât la rumegătoare, cum ar fi oi şi capre (cavităţi nazale, sinusuri frontale şi maxilare), cât şi la om (suprafaţa conjunctivală, gât, nas şi urechi), în special în timpul anotimpurilor calde ale anului, în ţările din Bazinul mediteranean. Rumegătoarele mici infectate pot prezenta dificultăţi de respiraţie, strănut, secreţii mucopurulente şi simptome neurologice la animalele infestate şi simptome precum hiperemie, prurit, durere, keratită şi lacrimare la oamenii infestaţi. Materialul acestui studiu constă din larve de Diptera colectate din ochiul drept al unui pacient de sex masculin în vârstă de 20 de ani, care s-a prezentat la Clinica de Urgenţă a Spitalului de Stat (Borçka, Artvin) în iulie. Larvele colectate (n: 6) au fost conservate în etanol 70%, apoi identificate ca larve de prim stadiu de *Oestrus ovis,* pe baza examenului microscop. Lucrarea îşi propune să raporteze un caz de oftalmomiază cauzată de *O. ovis* din nord-estul Turciei şi să contribuie la studiile fenologice ale acestei specii cu importanţă zoonotică.

Cuvinte cheie: Infestări cu artropode; *Oestrus ovis*; oftalmomiaza.

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Introduction

Ophthalmomyiasis is an infestation of with larvae of insect of order Diptera (maggots) at ocular level or in orbital tissues. The condition is known as internal ophthalmomyiasis or external ophthalmomyiasis according to the region where the larvae are located (Francesconi and Lupi, 2012; Singh and Singh, 2015). Many species that cause ophthalmomyiasis in humans have been reported from almost all continents: Calliphoridae (*Cochliomyia hominivorax, Chrysomya bezziana*, and *Lucilia cuprina*), Oestridae (*Cephenemyia ulrichii*, *Cuterebra* spp., *Dermatobia hominis*, *Gasterophilus intestinalis*, *Gedoelstia hasleri*, *Hypoderma bovis*, *H. lineatum*, *H. tarandi*, *Pharyngomyia picta*, and *Rhinoestrus purpureous*) and Sarcophagidae (*Wohlfahrtia* spp.) (Thakur et al., 2009; Panadero-Fontán and Otranto, 2015). Among these Diptera species, *Oestrus ovis* is the most common cause of ophthalmomyiasis in humans' most common cause of ophthalmomyiasis. Natural hosts of *O. ovis* are small ruminants such as sheep and goats, but people who spend more time close to these hosts (such as shepherds, sheep farmers, and veterinarians) come into contact with these hosts are at a higher risk (Pupić-Bakrač et al., 2020). In regions with a high prevalence of oestrosis in sheep and goats, the risk of human infestation may be increased (Ahaduzzaman, 2019). Human cases have been reported in regions with hot and dry climates, especially in spring or summer. Ophthalmomyiasis cases present with a series of symptoms such as hyperaemia, itching, photophobia, oedema, pain, red eye, keratitis, foreign body sensation with lacrimation, and rarely blindness. Some cases may also be subclinical (Thakur et al., 2009; Padhi et al., 2017). In the treatment of infestations, larvae are first removed manually. During this process, using ophthalmic solutions (cocaine 4-5%, lidocaine, pilocarpine 1-4%, paraffin oil, and proparacaine hydrochloride 0.5%) facilitates the collection of larvae. In addition, antibiotics such as neomycin, bacitracin, and polymyxin B can be used against secondary bacterial infections (Francesconi and Lupi, 2012; D'Assumpcao et al., 2019).

Case history

In July 2023, a 20-year-old male patient living in a rural area was admitted to the Emergency Clinic of State Hospital (Artvin,

Türkiye) with a sudden onset of pain and redness in his right eye. In the patient's anamnesis, there was information about only the strike of foreign bodies in the eye. He also said that he had no interaction with sheep and goats. External eye examination revealed no symptoms, but motile Diptera larvae were detected on the conjunctival surface. Firstly, in the conditions of medical intervention that the hospital has, the area was anaesthetised with an ophthalmic solution containing 0.5% proparacaine hydrochloride. Then the detected Diptera larvae were carefully removed using forceps and sterile gauze sponges. Finally, eye lavage was done with a sterile saline solution. All larval specimens were stored in Eppendorf tubes containing 70% ethanol until identification. For microscopic examination, larvae were prepared using lactophenol. They were identified as the first stage of *O. ovis* larvae in the light of relevant literature (Zumpt, 1965) and photographed with the camera integrated into the microscope (Figure 1 A-D). Additionally, the morphological characters of the collected larvae are described in detail in the next section.

Morphology of the first instars larvae

The larvae white or yellowish larvae were, spindle-shaped, and about 1.3 mm long (Figure 1). The cephaloskeleton was relatively large, and the curved mouth hooks were strongly bent; there were also 22-25 terminal spines arranged in two rows around. On the dorsal surface, spines were weak, with a complete row of spines on the third segment and an interrupted row of spines on the following two segments. On the ventral surface, the segments at their anterior margins showed two to three complete rows of spines and a series of hair-like structures on the lateral surface.

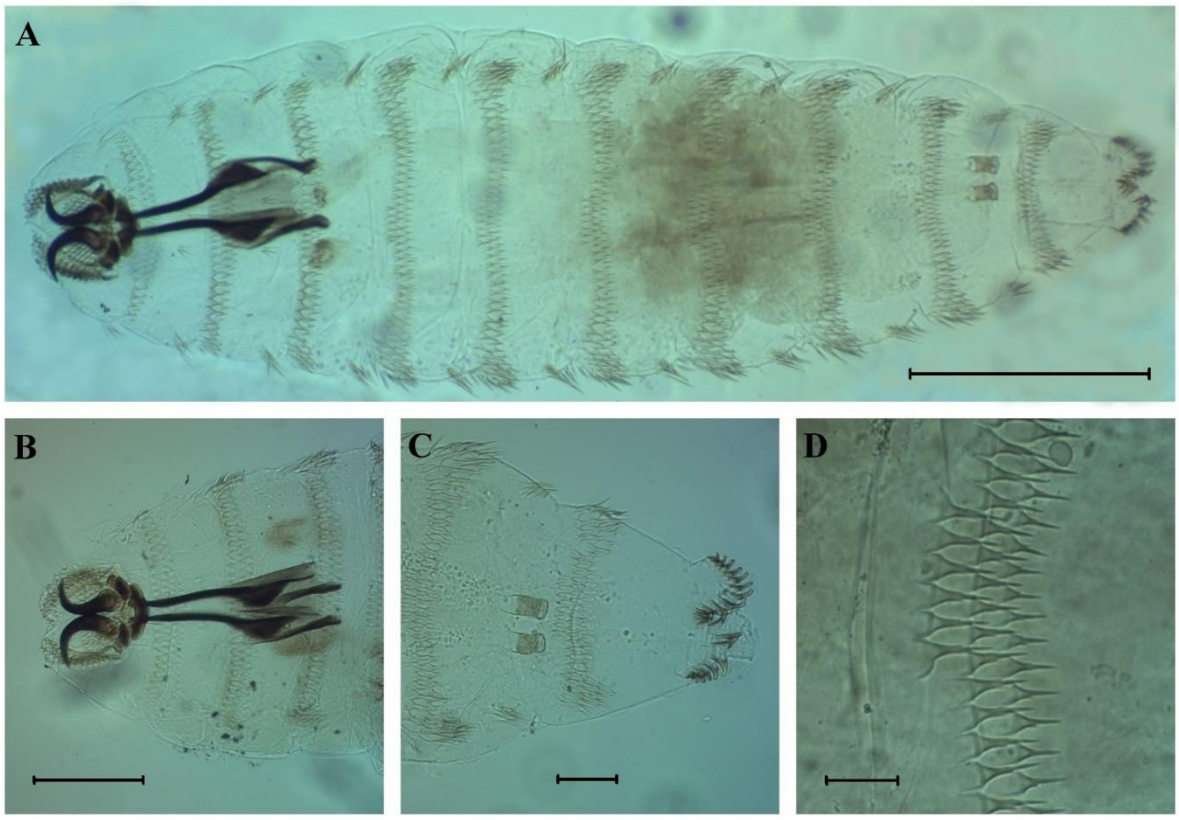

Figure 1: (A) First instars of *Oestrus ovis* (scale bar: 250 µm), **(B)** Cephalo-pharyngeal skeleton (scale bar: 100 µm), **(C)** Anterior spiracle (scale bar: 50 µm), **(D)** Spines on body (scale bar: 10 µm)

Discussion

Oestrus ovis (Diptera: Oestridae) is known as ''burun kurdu/nose worm'' among animal breeders in Türkiye, develops in the nasal cavity and frontal sinuses of ruminants such as sheep and goats. Adult larviparous females enter through the nostrils of their natural hosts and lay their first-instar larvae in this area during the natural cycle (Dinçer, 1997). Then the larvae move to the nasal cavity or sinus region. The second instar stage is completed in this area and then passes into the third instar. After the immature stages, the third instars fall to the soil and then develop into the pupal stage, lasting 3-4 weeks. Adult *O. ovis* has a lifespan of approximately 28 days. Humans are accidental hosts; adult flies may lay their larvae on the conjunctival surface (Tabouret et al., 2001; Gracia et al., 2019). Ophthalmomyiasis usually occurs in endemic regions with warm climates such as Mediterranean countries, predominantly between the end of June and the beginning of September (Pupić-Bakrač et al., 2020). In addition to these countries, ophthalmomyiasis cases have been reported in many Asian, African, Middle Eastern and Central American countries that are considered endemic (Panadero-Fontán and Otranto, 2015; Singh and Singh, 2015). As in other countries in the Mediterranean basin, many cases of myiasis caused by *O. ovis* have been reported in humans (Pupić-Bakrač et al., 2020) and animals (Dinçer, 1997; Eren et al., 2022) in Türkiye.

Generally, ophthalmomyiasis caused by *O. ovis* is a mild infestation because, in a healthy person, it cannot develop into second and third-instar larvae. However, cases of nasopharyngeal infestation caused by later instars have been reported in immunosuppressed patients (Quesada et al., 1990; White et al., 2015). Early diagnosis and treatment in cases of ophthalmomyiasis are essential to prevent complications (such as auricular, nasal and pharyngeal myiasis and secondary bacterial infections) that may occur later. In addition, removing animal manure from the environments where people live will reduce the risk of infestation (Francesconi and Lupi, 2012; D'Assumpcao et al., 2019). It should not be forgotten that it increases the risk of infestation for humans due to socioeconomic status, lack of welfare and hygiene, livestock activities in the environment and the dominant fly species population density (Dinçer, 1997; Singh and Singh, 2015).

Conclusion

As a result, when we evaluate the cases of ophthalmomyiasis, we see that although it is primarily reported from rural areas, it is also rarely reported from urban areas. Patients who apply to the hospital with foreign body sensations and conjunctivitis-like symptoms should be carefully examined for ophthalmomyiasis, especially in rural regions where sheep farming is common. Complete mechanical removal of larvae is of great importance for a favourable prognosis. The conjunctival surface needs to be carefully examined because: photophobic larvae are small and escape very quickly during inspection; larvae may not be removed by lavage as they can penetrate the conjunctiva.

This paper reported the first case of human ophthalmomyiasis caused by *Oestrus ovis* in North Eastern Anatolia (Artvin, Türkiye).

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