

First Record of a Gregarine Parasite of *Thanasimus formicarius* (L.) (Coleoptera: Cleridae) from Turkey

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Abstract

T*hanasimus formicarius* (L.) (Coleoptera: Cleridae) is a generalist predator that feeds on several important scolytid pest species in spruce, pine and broadleaf stands. *T. formicarius* is considered a very effective agent for biological control of the scolytid pests. It is mass produced in rearing laboratories and then released them against bark beetles. However, the production of this predator in the laboratory requires a great cost. Therefore, any infection by parasitic organisms in *T. formicarius* is undesirable. Gregarines (Protozoa: Apicomplexa), obligatory parasites of invertebrates, are especially frequent in Coleoptera. Several beetles of the Chrysomelidae (Coleoptera) family are frequently parasitized by gregarines. Determining whether any gregarine pathogen is present in *T. formicarius* is of great importance in the selection and reproductive use of healthy parents. In this study, the presence of gregarine pathogens of *T. formicarius* was investigated. As a result, a gregarine parasite of *T. formicarius* is reported for the first time.

Keywords: *Gregarine parasite, predator, Thanasimus formicarius, disease, mass-rearing*

I. INTRODUCTION

The bark beetles (Coleoptera: Curculionidae, Scolytinae) are one of the most destructive pests in Turkish forests. Predator insects have been used efficiently in the biological control of some important forest pest in Turkey [2, 4, 8]. Three predators play important role in the control of pine and spruce forest pests. The

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most common and effective natural enemies of the bark beetle is clerid beetle. *Tahansimus formicarius* (Coleoptera: Cleridae) is used in the biological control of bark beetles (Coleoptera: Curculionidae, Scolytinae) [5]. It is mass produced in rearing laboratories and released against bark beetles. Since a considerable amount of budget has been spent for breeding this predator, its predation rate needs to be increased. Therefore, it is necessary for these rear beetles to be healthy and have high foraging proficiency and fecundity, and any infection of few or some may undesirably impact the production of healthy beetles. However, it is also noteworthy to mention that they are also vulnerable to parasites that cause chronic diseases in insects reared in laboratories for biological control and reduce their foraging proficiency and fecundity.

Although many studies have been carried out to detect pathogens that cause diseases and reduce their effectiveness in other predators bred against forest pests in rearing laboratories [6, 7, 8], there is no study on the detection of pathogens and parasites of *T. formicarius* in Turkey. In the present study, a gregarine parasite of *T. formicarius* is reported for the first time from Turkey. The gregarine presented here is the first parasite recorded from this predator and is tentatively classified. Further research should be directed to the identification of this parasite and its distribution and effect in *T. formicarius* larvae and adults in the mass rearing laboratories in Turkey.

II. MATERIALS AND METHODS

Adults of *T. formicarius* were collected in Sinop (Boyabat) where the predator rearing laboratories are located, hence Turkey. Each beetle was dissected in a physiological solution and then prepared wet smears including host intestine was examined microscopically for the different life cycles of suspected parasites at a magnification of x40 to x400. Midgut of the predator was target organ for the microscopic observation. The trophozoites and gamonts of the parasites detected by the light microscopy were photographed using a microscope with a digital camera and soft imaging system.

III. RESULTS AND DISCUSSION

The bark beetle predator *T. formicarius* is produced in mass in production laboratories in Turkey with a great cost. Therefore, it is desirable to obtain healthy, non-infected predator insects at the end of production. However, pathogenic and parasitic organisms cause diseases in these beneficial insects. Studies on the detection, diagnosis and future treatment of these diseases are of great importance. During the study, parasitic infection was observed in adults of *T. formicarius* provided from the rearing laboratory in Sinop (Boyabat). Trophozoites and gamonts of the parasite were only observed in the midgut lumen of *T. formicarius*, associative form, precyst or cyst were not observed. Morphological features of the parasite showed that it is a cephaline gregarine. Septum separating protomerite and deutomerite was clearly visible. The gregarine parasite is divided into two segments, the protomerite and the deutomerite (Figure). The epimerite was knoblike and is divided by a septum from the rest of the protomerite.

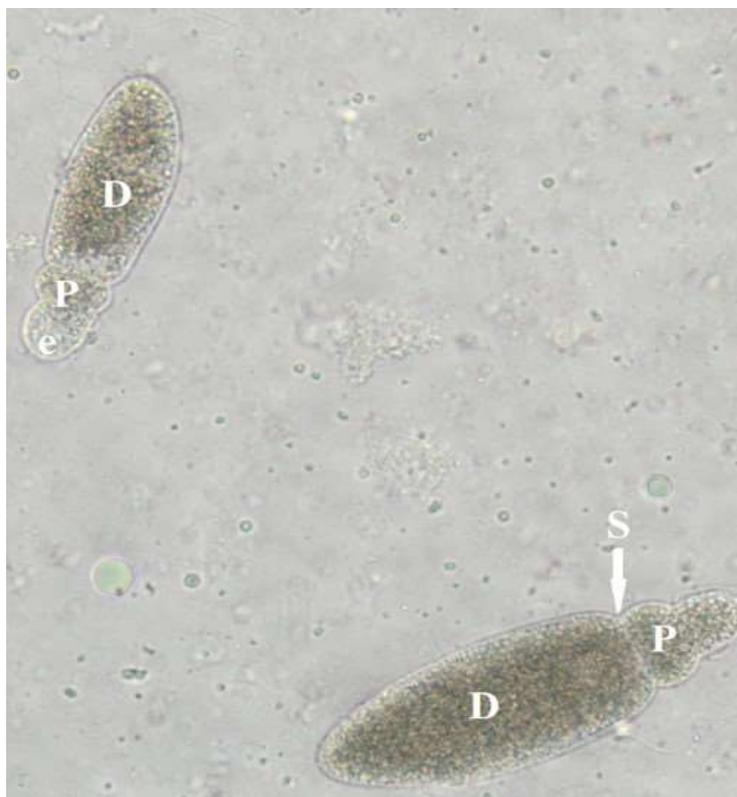


Figure. Trophozoite (left) and gamont (right) of the gregarine parasite in the gut lumen of *T. formicarius* (x200). P:protomerite, D:deutomerite, e:epimerite, S:septum

There is no gregarine record from *T. formicarius*. Therefore, the parasite has been recorded as a new gregarine parasite of *T. formicarius* for the first time. Further research will be directed towards observing other life stages of the parasite and its identification at species level.

Pathogenic and parasitic organisms cause reduction of foraging proficiency and fecundity of predator insects [1, 6]. On the other hand, it is known that gregarines are enteric parasites of invertebrates and have negative effects on host species. They influence the survival of the insects [3]. For this reason, any infection by pathogenic organisms in *T. formicarius* populations is undesirable, because higher biological control efficiency can be obtained with healthy beetles.

IV. CONCLUSION AND RECOMMENDATIONS

Gregarines are parasitic organisms, causing their hosts to become ill, rendering them ineffective. The gregarine infection shown in this study is the first record and should be defined at the species level, its interaction with the host should be clarified, and it should be considered in order to obtain healthy individuals in the mass-production of *T. formicarius*.

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