How does *Sarcoptes scabiei* var. *hominis* meet its oxygen needs?

To the Editor: Tunnels are located in the stratum corneum. Mites dig shallow tunnels without going deeper. Some authors suggest that mites meet their oxygen needs through the skin by the diffusion method and postulate that this is why they do not go deeper.[1]

There is very limited information on whether mites need oxygen and, if so, how they meet this need. They are known to be an aerobic mite, but how they use oxygen is unknown.[2] The oxygen requirements of female and male mites have been reported to be 0.002 and 0.0008 $\mu L\ O_2/h$, respectively. In a study examining the genomic features of scabies mites, a homologous gene was identified that supports trachea and salivary gland development.[2] This information suggests that mites need oxygen, but how they obtain oxygen remains unknown. If the mechanism of how mites obtain oxygen is discovered, new methods of treatment will be found by blocking the connection between mites and oxygen.

In our study, we aimed to find out how mites obtain oxygen. We used a UV dermatoscopy device for tunnel imaging which afforded us the opportunity to observe all details in tunnels more clearly. The question of why a mite with the ability to dig tunnels did not dig deeper and protect itself was actually the starting point of our study. When we examined the tunnels, we observed that there were holes in the tunnel ceiling and side borders at regular intervals. The image in Fig 1 could represent ventilation holes. The holes that were noticed on dermatoscopic examination could be holes where the hatched larva reached the skin surface. However, the fact that the holes were located at regular intervals made us think that these holes were created by the mite. We believe that the mite ventilated the tunnel in this way and met its oxygen needs. To confirm this finding, we removed the mite from the tunnel and examined it under a microscope. We placed the mite, which we found to be completely alive and active, in a container filled with water and kept it under water. We kept the mite under water for 20 minutes, took it out of the water, examined it under the microscope, and observed that the mite suffocated and was completely without oxygen. When we looked at other tunnels using UV dermatoscopy, we found that there were similar ventilation gaps in all tunnels (Fig 2).

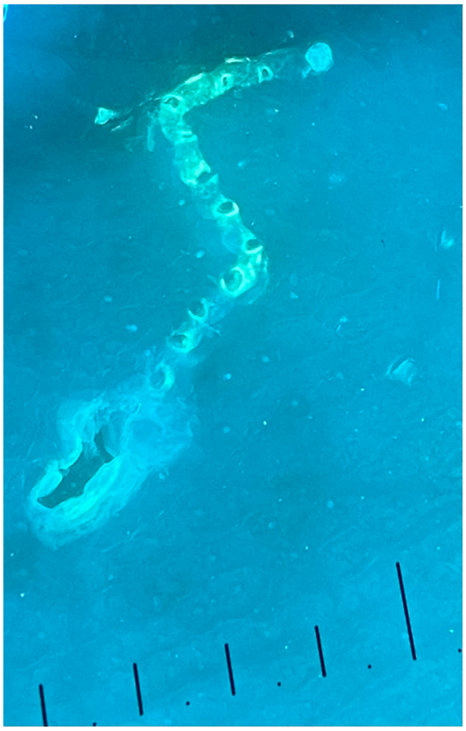

Fig 1. Tunnel view under a UV dermatoscope: pay attention to the air channels placed at regular intervals.

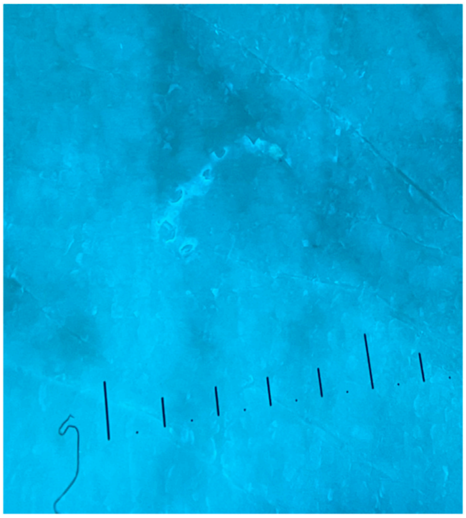

Fig 2. Ventilation spaces in the tunnel.

Although there are many studies on scabies, there are not enough illuminating the physiology of mites. The information we obtained about mites will enable us to understand its life cycle more clearly and gives us the opportunity to develop new treatment strategies. Our study, in which we examined 43 different tunnels, to our knowledge, is the first to propose how mites take in oxygen, and we think that it can provide ideas for future studies. An oxygen-proof material applied to tunnels could suffocate and kill mites and might add a new dimension to the treatment of scabies.

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Conflicts of interest

None disclosed.

REFERENCES

1. Kazan D, Demirsoy EO. Scabies; clinical findings, diagnosis, and treatment. *Acta Med Nicomedia*. 2020;3(2):80-87.
2. Arlian LG, Morgan MS, Rider SD. *Sarcoptes scabiei*: genomics to proteomics to biology. *Parasit Vectors*. 2016;9(1):1-13.

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