

roberto.coellope@ug.edu.ec

Correspondence:

## First report of *Cheyletiella* sp. in domestic cats from Ecuador

Primer reporte de *Cheyletiella* sp. en gatos domésticos de Ecuador

### **Roberto Darwin Coello-Peralta.**

Magister en Microbiología-mención Biomédica, Docente-Investigador de la Universidad de Guayaquil, Guayaquil, Ecuador, roberto.coellope@ug.edu.ec, <https://orcid.org/0000-0001-5152-2843>

### **Joseph Jair Chávez Fernández.**

Médico Veterinario-Zootecnista, Universidad de Guayaquil, Guayaquil, Ecuador, joseph.chavezf@ug.edu.ec, <https://orcid.org/0000-0003-0938-2650>

### **María de Lourdes Salazar Mazamba.**

PhD en Animal Science, Docente-Investigador de la Universidad de Guayaquil, Guayaquil, Ecuador, maria.salazarma@ug.edu.ec, <https://orcid.org/0000-0002-3402-8058>

### **Enrique Xavier Rodríguez Burnham.**

Magister en Microbiología-mención Biomédica, Docente-Investigador de la Universidad de Guayaquil, Guayaquil, Ecuador, xavier.rodriguezbr@ug.edu.ec, <https://orcid.org/0000-0002-4275-3831>

### **Abstract**

The present study aimed to determine the presence of *Cheyletiella* sp. in domestic cats that attended the "Israel Veterinary Clinic", located in Cdla. Garzota 2 of the city of Guayaquil, which is characterized by treating cases of dermatopathies in felines. The casuistry of this study ran from February 5 to July 5, 2016; For the identification of the ectoparasite, the method of superficial scraping of the skin with mineral oil was used, through a descriptive-cross-sectional and prospective study. Of a total of 102 felines aged between 6 months and 8 years, 30 animals (29.41%) presented dermatitis due to mites, and 15 cases were due to *Cheyletiella* sp. (14.70%). On the other hand, 70 owners of domestic cats were interviewed, of which 3 (4.28%) presented cases of persistent dermatitis with pruritus. This study reliably reports the first cases of infection by *Cheyletiella* spp. in Ecuador, where the current environmental conditions have contributed to the presentation of new parasitological cases, constituting an animal health and public health problem.

**Keywords:** Pruritus, feline, alopecia, mite, scabies

## Resumen

El presente estudio tuvo por objetivo determinar la presencia de *Cheyletiella* sp. en gatos domésticos que acudieron a la “Clínica Veterinaria Israel”, ubicada en la Cdla. Garzota 2 de la ciudad de Guayaquil, la cual se caracteriza por atender casos de dermatopatías en felinos. La casuística del presente estudio transcurrió entre el 05 de febrero al 5 de julio del 2016; para la identificación del ectoparásito, se utilizó el método de raspado superficial de la piel con aceite mineral, mediante un estudio de tipo descriptivo-transversal y prospectivo. De un total de 102 felinos con edades entre 6 meses a 8 años, 30 animales (29,41%) presentaron dermatitis por ácaros, y 15 casos fueron de *Cheyletiella* sp. (14,70%). Por otra parte, se entrevistaron a 70 propietarios de mascotas de los cuales 3 (4,28%) presentaron casos de dermatitis persistente con prurito. Este estudio informa de manera fehaciente los primeros casos de infección por *Cheyletiella* spp. en Ecuador, donde las condiciones ambientales actuales han contribuido a la presentación de nuevos casos parasitológicos, constituyendo un problema de salud animal y salud pública.

**Palabras clave:** Prurito, felino, alopecia, ácaro, sarna.

## Introduction

Scabies or acariasis is a skin disease present in some mammals and constitutes a serious Animal Health problem (OIE, 2019, p. 15), is produced by mites, which are arachnids (Taylor et ál., 2015) highly contagious in susceptible species but highly species specific, however, certain species can be transmitted to humans (zoonoses) (Mayer & Donnelly, 2012).

Generally, the acariasis in domestic cats is caused by: *Notoedres cati*, *Cheyletiella blakei* y *Otodectes cynotis* (Jofré et ál., 2009). In the case of cheyletiellosis, it is caused by *Cheyletiella* sp. of the suborder *Prostigmata*, family *Cheyletidae*, measure 300 to 530  $\mu\text{m}$  of long, they have an elongated rhomboid shape and are distinguished by a strongly striated cuticle with one or two dorsal scutes (Taylor et ál., 2015). The body, mouthparts, and legs have a number of relatively long, simple or barbed bristles, with distinct patterns on each; the anterior mouthparts are large (OIE, 2019, p. 15) and something that is very important for its identification is that *Cheyletiella* is characterized by having a claw on each palp directed towards the mouthparts and its legs ending in a double row of hairs instead of suckers.(Jofré et al., 2009), it usually has comb-shaped nails at the end of each of the legs (Rodríguez Vivas, 2015, p. 493).

There are 3 species of *Cheyletiella* that infect domestic cats; *C. yasguri*, *C. blakei* (Lane et ál., 1987) and *C. parasitovorax* (Moxham et ál., 1968), They were described as a cause of dermatitis in man for the first time in 1918 in Copenhagen (Jofré et al., 2009). The three species are morphologically very similar; however, at the knee of the first pair of legs is the solenidion

what in *C. parasitivorax* is globose, in *C. blakei* is conical and in *C. yasguri* has shape of heart (Taylor et al., 2015).

This genus has its habitat on the surface (it does not burrow) and live in the keratin layer of the skin and fur of several definitive hosts, which can be dogs, cats or rabbits (Mayer & Donnelly, 2012). The prevalence of *Cheyletiella* sp. is up to 20% in houses with infested animals, being possible to find it on floors and carpets (Jofré et al., 2009).

This acarus feeds on keratin debris and tissue fluids. (Dobrosavljevic et al., 2007; Rodríguez Vivas, 2015, p. 493) presents a cycle that includes the stages of egg, larva, nymph and adult, with a complete development time of 35 days (Bronswijk & de Kreek, 1976). Transmitted directly from one host to another and by fomites, fleas, lice, or flies (Jofré et al., 2009).

Cheyletiellosis in animals is very common on the back, shoulders and neck, however, they can include signs such as: layers of unkempt hair, inflammation, itching, alopecia, hyperkeratosis and abundant dandruff (in powder form) to which called "walking dandruff" (OIE, 2019, p. 15; Taylor et al., 2015).

In humans, this disease produces pruritic, papular, papulovesicular lesions, urticarial ecchymosis, vesiculobullous eruptions or excoriations, and pruritus. (Cohen, 1980, p. 3; Mayer & Donnelly, 2012; Wagner & Stallmeister, 2000) and is very common in arms and legs (Rosen, 2011, p. 5) the presence of erythematous lesions with a central crust, being very common in children, veterinarians, farmers and immunosuppressed (Jofré et al., 2009).

Ecuador registers a prevalence of acariasis in domestic cats of up to 24%(Aguilar, 2016, p. 94), but this is the first report of this acarus, with the objective of alerting animal health authorities, public health, health professionals and to inform the population in order to guide them in prevention efforts. Therefore, the objective of this article is to report the evidence for *Cheyletiella* sp. in areas of the urban sector of the Guayaquil city.

## **Materials and methods**

### **Area and time of Study**

The study was carried out at the "Israel Veterinary Clinic", located in Cdla. Garzota 2nd stage of the city of Guayaquil, located in the northern part of the city, province of Guayas, on the Ecuadorian coast (Google-Maps, 2018, p. 2), its geographical coordinates are 2° 12' 21.02" of South latitude, 79° 54' 28.62" of West longitude (Antipodas.net, 2018, p. 2). It is the city with the highest population density in Ecuador, with 2' 644 891 persons (INEC, 2017, p. 3). A descriptive, cross-sectional and prospective study was carried out between February 5 and July 5, 2016 and 102 house cats were investigated, presented by 70 owners/representatives.

## Survey and sampling

The study and the risk of acariasis in their environment were explained to the owners of domestic cats who attended the "Israeli Veterinary Clinic", after their consent, a survey was applied to 70 people.

The survey presented the following questions: age, sex, breed of the animal, signs of acariasis (animal data); Pet owners were also asked about: how many people live in the house, how many animals they own, their domestic cats have contact with family members, the presence of immunosuppressed patients, and the presence of people with symptoms similar to acariasis.

The 102 domestic cats were analyzed at the "Israeli Veterinary Clinic", located in Cdla. Garzota 2nd stage between the streets, Av. Agustin Freire Mz. 130, house 12 (Google-Maps, 2018, p. 2).

For sampling, the procedures described by Hnilica and Patterson (2016) were followed, for which the excess hair was removed, then the skin was superficially scraped with mineral oil and a number 10 scalpel in the area of the chin, back and ears of each cat; then the present specimen was mounted on a glass slide.

## Laboratory analysis

The method used was the superficial scraping of the skin with mineral oil and extended on a plate, later it was observed under an optical microscope using 40X and 100X objectives. For the analysis and interpretation of data, characteristics or keys described by Taylor et al. (2015); The dimensions of the acarus range from 300 to 530  $\mu\text{m}$  long, elongated rhomboid shape, strongly striated cuticle with one or two dorsal shields, large mouthparts, on each palp a claw directed towards the mouthparts, four pairs of legs, legs ending in a double row of hairs (Saevik et al., 2004; Taylor et al., 2015).

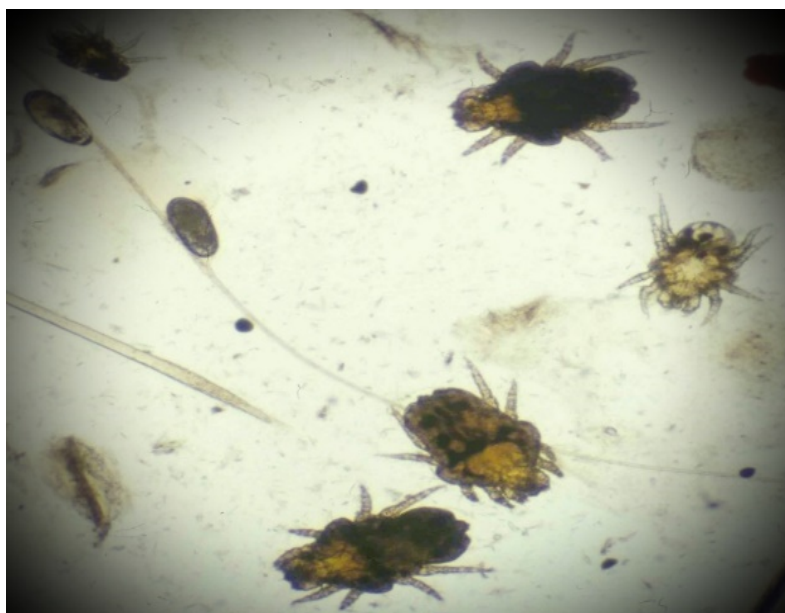
## Result

Of a total of 102 cats studied, aged between 6 months to 8 years, 15 cases of *Cheyletiella* sp. (14.70%).

Regarding the data obtained from the surveys carried out on the owners of domestic cats, it follows that: 55% of the cats were male and 45% female, 60% were mestizo cats and 40% belonged to one of the different domestic cat breeds, 30 cats (29.41%) presented signs similar to acariasis. The 70 people surveyed stated: that between 5 to 7 people make up their family, they have 1 to 3 cats, and 1 to 3 dogs, all their domestic cats have contact with other animals

and their relatives, they do not have immunocompromised relatives and 3 people (6%) presented signs similar to acariasis.

**Figure 1.** Presence of eggs, nymphs and adult stages of *Cheyletiella* sp. Lugol's stained and observed at 40X



Considering the morphological similarity of the parasite with those described by (Alvarado, 2012, p. 29); Hnilica and Patterson (2016); Taylor et ál. (2015), Subsequently, Amitraz in 0.25% solution prescribed in rubs every 5 days for 4 to 6 weeks was recommended for the treatment of infested cats. (Pérez-Tort & Sigal-Escalada, 2006) and topical selamectin (45mg) (Nolan & Lok, 2012) in a single dose of 6 mg/kg body weight from 8 weeks of age (Chailleux & Paradis, 2002; Zoetis, 2018, p. 2).

After 8 weeks of treatment, a skin scraping was performed to verify the elimination of the acarus, showing negativity for the presence of mites, especially *Cheyletiella* sp.

This is the first case report of *Cheyletiella* sp. in domestic cats in Ecuador, a tropical country with favorable environmental conditions for the appearance of new cases of Cheyletiellosis in cats, dogs, rabbits and humans. However, this is not the first case reported in the world, as it has been identified in countries such as England (Lee, 1981, p. 2), Italy (d'Ovidio & Santoro, 2015), Korea (Kim et ál., 2008), United States (Coman et ál., 1981; Thomas et ál., 2016), Canada (Scott & Paradis, 1990), Mexico (Alvarado, 2012, p. 29). The structure that was found presented the same morphological characteristics reported by Hnilica and Patterson (2016); Taylor et ál. (2015), which suggests the presence of this acarus in Ecuador.

Although there is little information in the world, Mégnin in 1878 was the first to describe adult mites of *Cheyletiella* sp., which he named *Cheyletus parasitovorax* (Bowman et ál., 2002; GBIF, 2022, p. 1). In cats, the first report of *Cheyletiella* sp. was made in 1917 in England (Lee, 1981, p. 2).

In a study carried out in Italy between 2011 and 2012, out of a total of 455 pet store rabbits, a 14.9% prevalence of *C. parasitovorax* was described (d'Ovidio & Santoro, 2015).

Between 2006 and 2007, in South Korea, *C. parasitovorax* was determined in 80 rabbits, out of a total of 140 rabbits, registering a prevalence of 57.14%. In the United States, there are different prevalences of *Cheyletiella blakey* that have been determined in domestic cats: 0,8% (Coman et ál., 1981), 0,9% (Thomas et ál., 2016), 26,19% (Fox & Reed, 1978); in Canada of a total of 111 cats, 10 were confirmed for *C. blakey* (9%) (Scott & Paradis, 1990) and in Mexico the presence of *Cheyletiella* sp. was determined at the Small Species Hospital of the Autonomous Agrarian University Antonio Narro, in a rabbit that lived with a dog and a cat (Alvarado, 2012, p. 29).

On the other hand, in Ecuador the presence of *Cheyletiella* sp. has not been determined, however, using parasitological techniques described by Hnilica and Patterson (2016), a 14.70% prevalence of the acarid was determined., what is among the parameters registered in the world, which is between 0.8 (Coman et ál., 1981) to 26,19% (Fox & Reed, 1978). Likewise, in this study signs similar to acariasis were presented both in cats and in their owners, this shows an active transmission between them, on the other hand, there is a risk of transmission to humans and other domestic animals.

## Conclusions

This study determines the first report of *Cheyletiella* sp. in domestic cats of a tropical region of the Ecuadorian coast and the presence of 3 cases in owners, therefore, the acarid zoonosis is evident, which reveals the latent risk of the presentation of new cases of this acariasis.

## Acknowledgments

To Dr. Heraldo Barzola Castro for allowing us to work at the “Israel Veterinary Clinic” during this investigation.

## References

- Aguilar, A. P. (2016). *Prevalencia de Otodectes cynotis en gatos que presentan otitis en el consultorio “Agrosierra” de la ciudad de Guayaquil*. [Tesis de Grado, Universidad Católica de Guayaquil, Ecuador], Repositorio Institucional UCSG. <http://repositorio.ucsg.edu.ec/handle/3317/5532>

- Alvarado, A. S. (2012). *Cheyletiellosis en conejos de la Comarca*. [Tesis de Grado, Universidad Autónoma Agraria Antonio Narro, Saltillo - México], Repositorio Institucional UAAN. <https://silo.tips/download/universidad-autonoma-agraria-antonio-narro-9>
- Antipodas.net. (2018). Coordenadas geográficas de Guayaquil. Primera. Retrieved 12/08/2018, 2018, from <http://www.antipodas.net/coordenadaspais/ecuador/guayaquil.php>
- Bowman, D. D., Hendrix, C. M., S., L. D., & Barr, S. C. (2002). *Feline clinical parasitology* (I. S. U. Press Ed. 1 ed. Vol. 1). Iowa: Blackwell Science Company. <https://zh.booksc.eu/book/8887103/832bb9>.
- Bronswijk, J. E., & de Kreek, E. J. (1976). Cheyletiella (Acari: Cheyletiellidae) of Dog, Cat and Domesticated Rabbit, a Review. *Journal of Medical Entomology*, 13(3), 315-327. doi: 10.1093/jmedent/13.3.315
- Cohen, S. R. (1980). Cheyletiella dermatitis: A mite infestation of rabbit, cat, dog, and man. *Archives of Dermatology*, 116(4), 435-437. doi: 10.1001/archderm.1980.01640280071023
- Coman, B. J., Jones, E. H., & Driesen, M. A. (1981). Helminth parasites and arthropods of feral cats. *Aust Vet J*, 57(7), 324-327.
- Chailleux, N., & Paradis, M. (2002). Efficacy of selamectin in the treatment of naturally acquired cheyletiellosis in cats. *The Canadian Veterinary Journal*, 43(10), 767-770.
- d'Ovidio, D., & Santoro, D. (2015). Survey of zoonotic dermatoses in client-owned exotic pet mammals in southern Italy. *Zoonoses Public Health*, 62(2), 100-104. doi: 10.1111/zph.12100
- Dobrosavljevic, D. D., Popovic, N. D., & Radovanovic, S. S. (2007). Systemic manifestations of Cheyletiella infestation in man. *Int J Dermatol*, 46(4), 397-399. doi: 10.1111/j.1365-4632.2007.03098.x
- Fox, J. G., & Reed, C. (1978). Cheyletiella infestation of cats and their owners. *Archives of Dermatology*, 114(8), 1233-1234. doi: 10.1001/archderm.1978.01640200085029
- Global Biodiversity Information Facility (GBIF). (2022). Cheyletiella parasitovorax Mégnin, 1878. Checklist of Norwegian ticks and mites (Acari). Fauna norv. Ser. B 26, 31-45.
- Google-Maps (Cartographer). (2018). Mapa de Guayaquil. Retrieved from <https://www.google.com.ec/maps/place/2%C2%B008'28.8%22S+79%C2%B053'11.6%22W/@-2.1413233,-79.8876453,18z/data=!3m1!4b1!4m16!1m9!4m8!1m0!1m6!1m2!1s0x902d6d0fe1f00e07:0x57946b0a41ed8937!2sveterinaria+israel+la+garzota+guayaquil+google+maps!2m2!1d-79.8865401!2d-2.1414065!3m5!1s0x0:0x0!7e2!8m2!3d-2.1413261!4d-79.8865514>
- Hnilica, K., & Patterson, A. (2016). *Small Animal Dermatology* (Elsevier Ed. Fourth Edition ed. Vol. I). St. Louis - Missouri: Saunders. <https://www.elsevier.com/books/small-animal-dermatology/hnilica/978-0-323-37651-8>
- INEC. (2017). Guayaquil en cifras. I. Retrieved 12/08/2018, 2018, from <http://www.ecuadorencifras.gob.ec/guayaquil-en-cifras/>

- Jofré, L. M., Noemí, I., Neira, P. O., Saavedra, T. U., & Díaz, C. (2009). Acarosis y zoonosis relacionadas. *Revista chilena de infectología*, 26, 248-257.
- Kim, S. H., Jun, H. K., Song, K. H., Gram, D., & Kim, D. H. (2008). Prevalence of fur mites in pet rabbits in South Korea. *Vet Dermatol*, 19(3), 189-190. doi: 10.1111/j.1365-3164.2008.00673.x
- Lane, R. S., Shachter, S. P., & Keh, B. (1987). Cheyletiella blakei, an Ectoparasite of Cats, as Cause of Cryptic Arthropod Infestations Affecting Humans. *Western Journal of Medicine*, 146(2), 192-194.
- Lee, B. W. (1981). Cheyletiella dermatitis. *Arch Dermatol*, 117(10), 677-678.
- Mayer, J., & Donnelly, T. M. (2012). *Clinical Veterinary Advisor: Birds and Exotic Pets* (First ed. Vol. I). Georgia - USA.
- Moxham, J. W., Goldfinch, T. T., & Heath, A. C. G. (1968). Cheyletiella parasitivorax infestation of cats associated with skin lesions of man. *New Zealand Veterinary Journal*, 16(4), 50-52. doi: 10.1080/00480169.1968.33746
- Nolan, T. J., & Lok, J. B. (2012). Macrocyclic lactones in the treatment and control of parasitism in small companion animals. *Curr Pharm Biotechnol*, 13(6), 1078-1094.
- OIE. (2019). Sarna. *Manual Terrestre de la OIE*. Retrieved from Sarna website: [https://www.oie.int/fileadmin/Home/esp/Health\\_standards/tahm/3.09.07\\_MANGE.pdf](https://www.oie.int/fileadmin/Home/esp/Health_standards/tahm/3.09.07_MANGE.pdf)
- Pérez-Tort, G., & Sigal-Escalada, G. (2006). *Demodicosis en caninos y felinos* (I. M. SA. Ed. I ed. Vol. I). Buenos Aires - Argentina: Intermedica.
- Rodríguez Vivas, R. I. (2015). *Técnicas para el diagnóstico de parásitos con Importancia en Salud Pública y Veterinaria* (AMPAVE Ed. First ed. Vol. I). Yucatán - México: AMPAVE.
- Rosen, L. B. (2011). Dermatologic Manifestations of Zoonotic Diseases in Exotic Animals. *Journal of Exotic Pet Medicine*, 20(1), 9-13. doi: 10.1053/j.jepm.2010.11.004
- Saevik, B. K., Bredal, W., & Ulstein, T. L. (2004). Cheyletiella infestation in the dog: observations on diagnostic methods and clinical signs. *J Small Anim Pract*, 45(10), 495-500.
- Scott, D. W., & Paradis, M. (1990). A survey of canine and feline skin disorders seen in a university practice: Small Animal Clinic, University of Montréal, Saint-Hyacinthe, Québec (1987-1988). *The Canadian Veterinary Journal*, 31(12), 830-835.
- Taylor, M. A., Coop, R. L., & Wall, R. L. (2015). *Veterinary Parasitology* (W. Blackwell Ed. Fourth edition ed. Vol. 1). Reino Unido: Willey Blackwell.
- Thomas, J. E., Staubus, L., Goolsby, J. L., & Reichard, M. V. (2016). Ectoparasites of free-roaming domestic cats in the central United States. *Veterinary Parasitology*, 228, 17-22. doi: <https://doi.org/10.1016/j.vetpar.2016.07.034>
- Wagner, R., & Stallmeister, N. (2000). Cheyletiella dermatitis in humans, dogs and cats. *British Journal of Dermatology*, 143(5), 1110-1112. doi: doi:10.1046/j.1365-2133.2000.03869x

Zoetis. (2018). Revolution 12%. Antiparasitario interno y externo. (Salamectina). p. 2.  
Retrieved 12/08/2018, 2018, <https://ar.zoetis.com/products/caninos/revolution-12.aspx>