

## First report of *Dermatophilus congolensis* infections in local Omani cattle.

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### التقرير الأول عن عدوي المجتدة الكونغولية في الأبقار المحلية في سلطنة عمان

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**ABSTRACT.** Dermatophilosis is an infectious skin disease in animals and man caused by *Dermatophilus congolensis*. **Objective:** to report the isolation of *Dermatophilus congolensis* from paint-brush matted hairs to wart-like skin lesions in 12.1% of quarantined local cattle from the Sultanate of Oman. **Methodology:** skin scrapings, blood samples and skin biopsies were aseptically collected from the affected cattle for bacteriological, hematological and histopathological examinations, respectively. **Results:** bacterial cultural and staining characteristics of skin scrapings were confined with *D. congolensis*. Neutrophilia were reported in 86.75% of the examined animals. Histologically, there was severe multifocal exudative dermatitis with hyperkeratosis. Affected animals were treated successfully with three doses of long-acting oxytetracycline (20 mg/kg; IM injection) with topical application of antibiotic spray. **Conclusion:** this is the first report of dermatophilosis in local Omani cattle, and field veterinarians should be kept up to date with this recent detected disease.

**KEYWORDS:** *Dermatophilus congolensis*, Oman, Pathology, Natural infection, Zoonotic disease

**المستخلص.** المقدمة: داء المجتدات هو مرض جلدي معدي في الحيوانات والإنسان يسببه بكتريا المجتدة الكونغولية. الهدف: تسجيل عزل بكتيريا المجتدة الكونغولية من أفات جلدية تتراوح بين شعر متلبد يشبه فرشاة الطلاء إلى شبيه التآليل في 12.1% من ابقار محلية في الحجر البيطري في سلطنة عمان. المنهجية: تم تجميع كشط جلدي وعينات دم وخزعات جلدية معقمة للفحص البكتيري والدموي والنسيجي، بالترتيب. النتائج: اظهرت الزراعة البكتيرية والصبغ للكشط الجلدي بكتيريا المجتدة الكونغولية وكذلك زيادة العدلات في الدم في 86.75% من الحيوانات المفحوصة. لوحظ التهاب جلدي نضحي وخيم مع فرط التقرن بالفحص الهيستوباثولوجي وقد تم علاج الحيوانات المصابة بنجاح باستخدام ثلاثة جرعات من دواء أوكسي تتراسيكلين طويل المفعول (20 mg/kg عن طريق الحقن العضلي) مع استخدام علاج موضعي باستخدام بخاخ المضاد الحيوي. الاستنتاج: هذا هو التقرير الأول عن داء المجتدات في الأبقار المحلية بسلطنة عمان وينبغي إحاطة الأطباء البيطريين العاملين بالحقل بهذا المرض المكتشف حديثاً.

**الكلمات المفتاحية:** المجتدة الكونغولية، سلطنة عمان، أفات مرضية، عدوي طبيعية، مرض حيواني المنشأ

## Introduction

**D**ermatophilosis is a skin disease of cattle, sheep, camels, goats, horses and other wildlife species (Gebreyohannes and Gebresselassie 2013). The diseases is caused by *Dermatophilus congolensis*, a facultative anaerobic gram-positive branching filaments bacteria with both transverse and longitudinal fragments formed from packs of coccoid bodies arranged in parallel rows giving the characteristic 'train track' morphology (Quinn and Markey 2003). Although dermatophilosis is worldwide, more economic losses are encountered in tropical countries. Losses are mainly attributed to dam-

aged hides, decreased production and culling (Stewart 1972). Skin abrasions and humid conditions triggers the dormant coccoid bodies to become motile flagellated zoospores that breakthrough the barriers of the skin and forms invasive filamentous in the hair follicle and superficial epidermis (Yeruham et al. 2003). Presence of the bacteria evokes an acute inflammation that recruits neutrophils resulting in multiple microabscesses formation in the epidermis. The characteristic crusty cutaneous lesions are the outcome of repeated episodes of the inflammatory reaction against the bacteria and the epidermal regeneration (Yeruham et al. 2003). Ticks and biting flies compromising the skin integrity might be involved in the mode of transmission (Quinn et al. 2011); moreover, various enzymes including proteases, keratinases, and ceramidase produced by the *D. congolensis* might play a key role in the pathogenesis. Lesions are frequently seen on the back of the animals, ears of nursing kids and distal extremities. The diseases is zoonotic,

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**Figure 1.** Dead cow with skin lesions on the neck and perineal areas (A & B); clinically ill cow with active skin lesions, focal alopecia and dermatitis on the face and neck (C); matted hair resembling paint brush pulled from the skin lesions (D & E); slightly hemorrhagic and eroded skin surface following the removal of the matted hair (F).

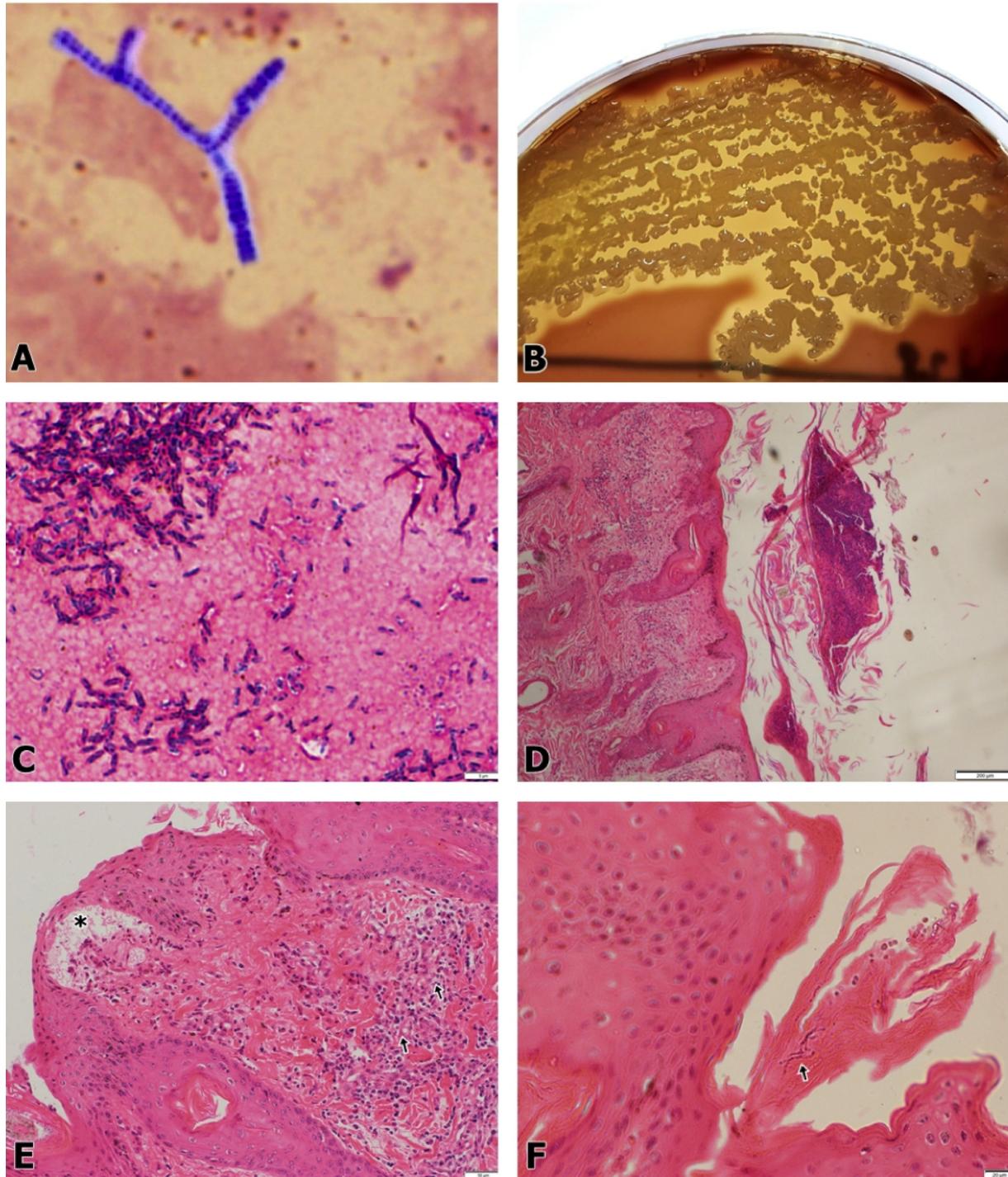
few human cases have been reported in the form of pustules and eczema on the hands and forearms of patients following direct contact with infected animals (Burd et al. 2007; Dean et al. 1961).

This study describes the detection of dermatophilosis infection and successful treatment in local cattle in the Sultanate of Oman.

## Materials and Methods

### Animal and case history

On January 2018, a dead cow was submitted to the Central Laboratory for Animal health, Ministry of Agriculture and Fisheries, Muscat, Oman. The animal was covered with skin lesions all over its body with intense lesions on the neck and perineal areas (Fig. 1A & 1B). The dead cow and other 16 diseased animals out of 140 (12.1%) was part of a herd that was collected from differ-



**Figure 2.** Direct smear from the skin lesions stained with gram stain: gram positive bacteria showing the typical train track morphology of the *D. congolensis*. 1000x (A); Cultured smear from the skin lesion showing irregular, yellowish-grey, beta hemolytic colonies on sheep blood agar (B); gram positive *D. congolensis* from culture smear 48 hours post culture (C); skin epidermis showing a multilaminated crust that are heavily infiltrated with neutrophil (D); skin dermis showing micro-abscess with clear fluid and neutrophil infiltrations (asterisk) and mononuclear cells (arrows) (E); skin epidermis showing branching filaments of *D. congolensis* bacteria arranged in parallel rows (arrow) (F).

ent governorates (Ad Dakhiliyah, Al Batinah North, Al Batinah south and Dhofar) and quarantined for exportation purpose.

### Bacteriological examination

Fresh skin scraping and crusts were collected aseptically from the dead cow and the other clinically ill animals and mixed in a few drops of sterile distilled water on a glass slide then stained with gram stain. Crusts and skin lesions were inoculated in sheep blood agar plate at 37 °C for 48 hours with 5% CO<sub>2</sub> (Quinn and Markey 2003).

### Hematology

Blood samples were collected from the clinically ill animals by Vacutainer systems from the jugular vein. Hematological parameters were measured using Vet Auto Hematology Analyzer® (model BC 2800, Mindray). The mean value was determined for following parameters: total and differential leucocyte count, red blood cell count, platelet count, hemoglobin concentration, mean corpuscular hemoglobin, mean corpuscular hemoglobin concentration, mean cell volume, and packed cell volume.

### Sampling for histopathology

Skin biopsies were taken using a disposable sterile blade, then immediately fixed in 10% neutral buffered formalin. Following fixation, samples were routinely processed, trimmed, sectioned and stained with hematoxylin and eosin (H&E) for histopathological evaluation according to Bancroft (2013). Consecutive sections were stained with Giemsa stain.

## Results

The necropsied cow showed severe icterus not related to the skin lesions. Clinically, the reported skin lesions from 16 affected cows consisted of exudative dermatitis, matted hair, focal areas of alopecia and crust formation as shown in Figure 1 (C, D, & E). Removal of the matted hair or crusts left an eroded skin surface that usually bleeds (Fig. 1F). Purulent exudate was noticed in active lesions. Upon bacteriological examination of skin scrapings and crusts, resulting colonies were beta hemolytic, 1-2 mm in diameter, yellowish grey in color, rough, convex and attached firmly to the blood agar surface which is consistent with *D. congolensis* (Fig. 2B). Gram staining of both direct smears (Fig. 2A), smears from the cultured colonies (Fig. 2C) revealed gram-positive, branching filaments bacteria with both longitudinal and transverse fragments, and piled with coccoid bodies.

Although, there were no significant differences (data not shown) in most of the blood parameters when compared to reference value, 86.75% of the examined cattle showed neutrophilia.

Histopathologically, there was severe, multifocal, ex-

udative and proliferative dermatitis. The epidermis was diffusely thickened by acanthosis, hyperkeratosis and multilaminated crusts that are heavily infiltrated with neutrophils (Fig. 2D). The dermis showed moderate to severe edema, hemorrhage, and was infiltrated by both neutrophils and mononuclear cells (Fig. 2E). Branching filaments of *D. congolensis* bacteria arranged in parallel rows and piled with coccoid bodies were detected in the stratified crusts of both H&E (Fig. 2F) and Giemsa stained sections.

Clinically infected animals were isolated and treated successfully with three doses of intra muscular injection of long-acting oxytetracycline 20 mg/kg every 2 days with topical application of antibiotic spray containing chloramphenicol and gentian violet and proper disinfection of the shed.

## Discussion

The current study documented the first natural *D. congolensis* infections in local cattle in Sultanate of Oman. In neighboring countries, Dermatophilosis has been reported in camels in Saudi Arabia (Gitao et al. 1998), United Arab Emirates (Joseph et al. 1998), and Jordan (Tarazi and Al-Ani 2016), and in dairy cows in Iran (Jafari Shoorijeh et al. 2008), and different animals (cattle, buffalo, goat, horse and antelope) in India (Pal 1995). The high humidity, overcrowding of the animals, presence of ticks, biting flies and skin injury during animal transportations are all predisposing factors for the emergence of this infection (Zaria 1993). In the current study, the infected animals were collected for exportation purpose from different governorates after heavy rains during December 2017. The reported skin lesions were in consistent with previous reports of *D. congolensis* infection in cattle (Carter and Cole, 1990; Quinn and Markey, 2003; Quinn et al., 2011). Colony morphology and staining characteristics of the infective agent were confined with *D. congolensis* (Quinn and Markey 2003). All infected animals were successfully treated as described by Osman (2014) and skin lesions were partially healed after 10 days. Moderate economic losses are encountered to the small-scale cattle herders due to damaged hide and decreased milk and meat production. Monitoring skin lesions in Omani cattle is essential and field veterinarians should be kept up to date with recent detected disease.

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