

Short communication

Identification of *Struthiopterolichus* sp. (Astigmata: Pterolichidae) in ostriches (*Struthio camelus camelus*) from Cauca, Colombia

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ABSTRACT

Objective. Identify ectoparasites in the primary feathers of adult ostriches in a hatchery of Department from Cauca, Colombia. **Materials and methods.** A total of fifteen adult animals (over 7 years old) with an average weight of 120 kg (10 were females and 5 males) were selected for the study. From each specimen, three primary feathers were extracted in the wing, being deposited in plastic bags and sent to the Basis science laboratory at Universidad Antonio Nariño. A counter sample of mites fixed in alcohol at 70% was sent to laboratory of the Universidad Nacional, then, the parasites were mounted on slides and under the microscope. This study was descriptive and convenient. **Results.** The feathers had disorganized barbs and a brown powder on the rachis. Microscopically was identified approximately 1000 specimens of a feather mite per sample of order Astigmata, family Pterolichidae and genus *Struthiopterolichus* sp., being able to differentiate male, female, nymphs and larvae. This is the first report of the mite *Struthiopterolichus* sp. in ostriches from Colombia. **Conclusions.** In the ostriches inspected were collected feathers that contained the mite *Struthiopterolichus* sp. The evidence of this mite can generate alerts of control and health surveillance inside of the hatchery.

Keywords: Acari; birds; ectoparasites; feathers; Struthioniformes (*Sources: DeCS, FAO, MeSH*).

RESUMEN

Objetivo. Identificar ectoparásitos en las plumas primarias de avestruces adultas alojadas en un criadero del Departamento del Cauca Colombia. **Materiales y métodos.** Un total de 15 aves adultas (mayores de 7 años), con un peso promedio de 120 kg (10 hembras y 5 machos) fueron seleccionadas para el estudio. De cada ejemplar fueron extraídas tres plumas primarias del ala, siendo depositadas

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en bolsas plásticas para ser enviadas al Laboratorio de ciencias básicas de la Universidad Antonio Nariño. Una contramuestra de ácaros fijados en alcohol al 70% fue enviada a la Universidad Nacional, posteriormente, los parásitos se montaron en láminas examinadas al microscopio. Este estudio fue de tipo descriptivo y a conveniencia. **Resultados.** Las plumas poseían barbas desorganizadas y en su raquis un polvo de color café, al analizarlas microscópicamente, se obtuvo aproximadamente 1000 especímenes de un ácaro de pluma por muestra, del orden Astigmata, familia Pterolichidae y género *Struthiopterolichus* sp., lográndose diferenciar hembras, machos, ninfas y larvas. Este es el primer reporte del ácaro de *Struthiopterolichus* sp. en avestruces de Colombia. **Conclusiones.** En los avestruces inspeccionados se colectaron plumas que contenían el ácaro *Struthiopterolichus* sp. La evidencia de este ácaro puede generar alertas de control y vigilancia sanitaria al interior del criadero.

Palabras claves: Acari; aves; ectoparásitos; plumas; Struthioniformes (*Fuentes: DeCS, FAO, MeSH*).

INTRODUCTION

The ostrich (*Struthio camelus*) is a species of running bird originally from the African continent. It has been domesticated for productive purposes with three relevant ones: meat, leather and feathers. Ostrich's meat is rich in proteins and low in fats. Leather and feathers are widely used in fashion industry (1,2,3). Animal products obtained are also used for decoration and for machinery and delicate equipment cleaning (4).

The bird is quite resistant with high adaptability under various climatic and nutritional conditions, allowing it to live in various continents including America. Ostriches arrived in Colombia in the 1990's and currently, hatcheries in Colombia are well established specially in Department of Meta, Cundinamarca, Cauca, Valle del Cauca, Boyacá and Quindío (5).

The Colombian Agricultural and Livestock Institute (ICA), maintains a strict vigilance and control over authorized hatcheries in the country, evaluating biosafety and sanitary planning (vaccination for Newcastle is demanded). However, despite such sanitary measurements to prevent introduction or transportation of pathogenic agents, some hatcheries have been identified with individuals carrying internal parasites, that may lead to diseases on susceptible animals (5,6).

On the other hand, it has been described by different authors that ratites can also carry ectoparasites on their skin and feathers. Most commonly mites like (*Struthiopterolichus bicaudatus* and *Dermoglyphus pachycnemis*) (7,8,9,10). Some of these parasites mentioned can cause skin irritation, damage and falling of feathers, reducing the birds' wellbeing, therefore, lowering the quality its product (4,7,10,11). Because of this, the main purpose of this study was to identify ectoparasites on primary feathers

of the adult subjects in a hatchery on Department of Cauca.

MATERIALS AND METHODS

Area of study. The study was conducted at an ostrich hatchery located in the rural zone of the Municipality of Puerto Tejada north of the Department of Cauca, Colombia. Location coordinates 3°13'48" N, 76°25'3" O. The hatchery is located at an altitude approximately 970 MASL with an average temperature of 24°C. Pluvial precipitation between 1000 to 2000 mm and a relative humidity between 70 to 90%. Study animals were grouped by age and reproductive state, in different barnyards and fed by rationed amounts of food with diverse species of plants such as nacedero (*Trichanthera gigantea*), king grass (*Pennisetum purpureum*), Pinto peanut (*Arachis pintoi*) and Gliricidia (*Gliricidia sepium*).

Animals of study. This study was of descriptive and suitable type. Selected hatchery had 290 subjects of different ages from which 200 were already adults. Fifteen red-neck ostriches (*Struthio camelus camelus*) over seven years of age were selected. Average adult weight of 120kg. From the 15 selected subjects 10 were female and 5 males. The study lasted 2 months between recollection and the obtained results.

Handling and sampling. This study was endorsed by the ethics committee of the Antonio Nariño University (Protocol number 2019-02). Handling of subjects was performed by qualified personnel. For capturing the individuals, it was used a plastic covered metallic rod, to hold the ostrich's neck, followed by covering its head to avoid further stress. The procedure to obtain feathers took approximately five minutes per bird. Three primary feathers from the wing

of each subject were extracted. Placed and labeled into plastic bags and sent to the Science laboratory of the Antonio Nariño University (UAN), Popayán, Colombia.

Laboratory analysis. Through an optical microscope with a 10 and 40x zoom (Leica DM300) it was observed that all collected feathers were infested by mites. A counter-sample was sent with such specimens preserved in 70% alcohol to the veterinary parasitology laboratory of the National University of Colombia (UNAL). Mites were cleaned and mounted on slides under a Hoyer's solution for future analysis. Preservation, clarification and mounting were performed under Faccini et al (12), methods. The diagnosis was performed using an optical microscope (Nikon 200 Eclipse, Tokyo, Japan) for its respective classification.

RESULTS

All samples of primary feathers from the ostriches analyzed were infested with mites. Enough material was obtained from the rachis (Figure 1) for future taxonomic identification. The veterinary parasitology laboratory of the National University of Colombia team diagnosed the presence of a feather mite of the genus *Struthiopterolichus* (Astigmata: Pterolichae), with a high chance of belonging to the species *S. bicaudatus*. Mites found in different stages on adult feathers (Figures 2A and 2B), and also, larva and nymph (Figures 3A and 3B). These specimens were deposited in the Veterinary parasitological collection CPV-UN registered under CPV-UN (A6).

Mites were morphologically characterized by an obvious sexual dimorphism observable with the lowest magnification (4x) under light microscopy. Male (Figures 2A): total length (TL) of ~600 µm, presence of forward plate (fp) and a posterior plate (pp) that presents a polygonal pattern

seen from the back or dorsal point, posterior lobes (pl) with suction cups (sc), bifurcation (b) of the posterior lobes and two long sensillum on each lobe. Female (Figures 2B): TL ~800 µm, presence of a forward plate (fp) and a posterior plate (pp) shows a polygonal pattern seen from the dorsal point, genital pore (gp) and 4 long sensillum on the posterior border of the idiosome without bifurcation. Nymph (Figures 3A): LT ~600 µm. Presence of: forward (fp) and posterior plate (pp) with polygonal pattern seen from the dorsal point and four long sensillum in the posterior edge of the idiosome. Larva (Figures 3B): TL ~300 µm, presence of three pairs of legs, a forward plate (fp) and a posterior plate (pp) with polygonal pattern viewed from the back and two long sensillum in the posterior edge of the idiosome. Additionally, there is a similarity in sizes in all pairs of legs throughout different stages of development (13,14).



Figure 1. Presence of mites, with the aspect of "brown colored dust" on the feather's rachis.

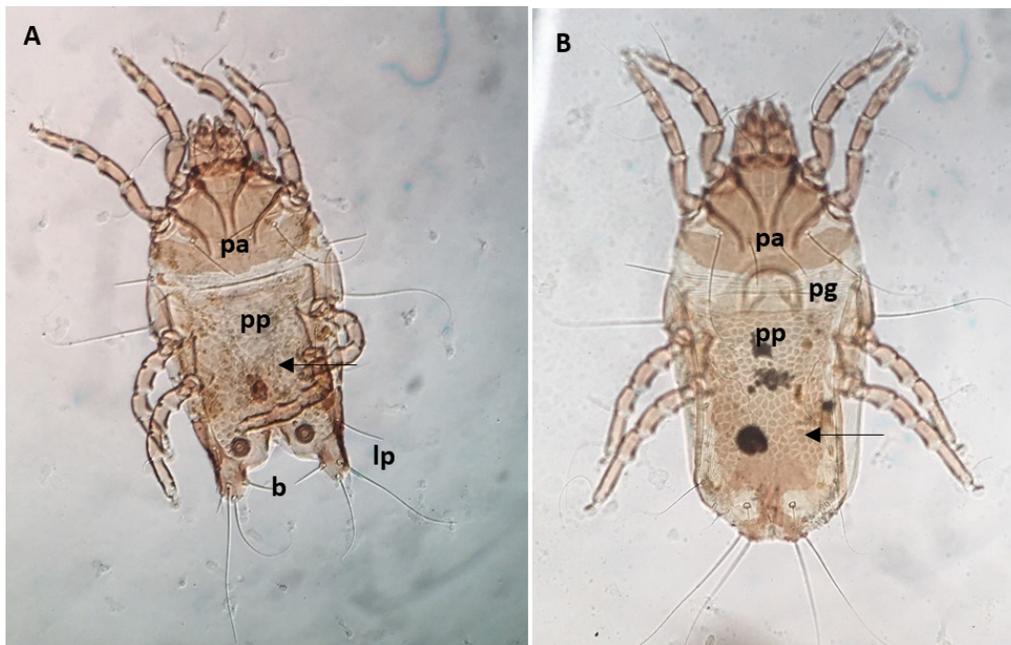


Figure 2. *Struthiopterolichus* sp. **A. Male** (10x), fp (forward plate), pp (posterior plate), pl (posterior lobes), b (bifurcation), sc (suction cups), arrow (polygonal pattern). **B. Female** (10x), fp (Forward plate), pp (posterior plate), gp (genital pore), arrow (polygonal pattern).

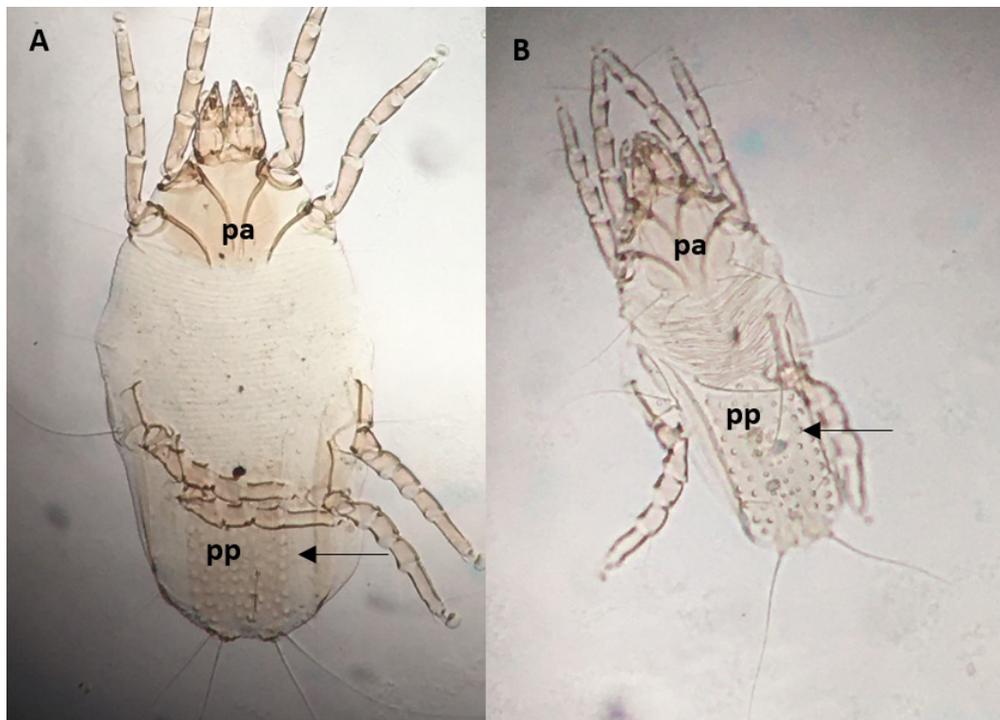


Figure 3. *Struthiopterolichus* sp. **A. Nymph** (10x), fp (forward plate), pp (posterior plate), arrow (polygonal pattern). **B. Larva** (10x), FP (forward plate), pp (posterior plate), arrow (polygonal pattern).

DISCUSSION

In this study, it was observed that at hatchery located in the Department of Cauca, Colombia, presented a mite infestation from the genus *Struthiopterolichus* sp., on the primary feathers

of ostriches. These mites are mostly known as feather mites and were first recorded in 1843 on ostrich in Paris (15). However, from the taxonomical point of view, it has been difficult to identify, because there aren't specific taxonomical keys and the mite has been reported

on other studies as *Gabucinia bicaudate* (4,7,10), *Pterolichus bicaudatus* or *Struthiopterolichus bicaudatus* (12,16). The nomenclature for *S. bicaudatus*, makes a reference on its relationship with the host (*Struthio camelus*), since it is considered that this mite is species-specific, which would be in agreement with this first report. However, it must be taken into account that, even though the morphological description exposed here and the literature references, indicates this as such specie, it is relevant to obtain genetic sequencing that would allow it to be related with other species of Pterolichidae family.

It was also observed the damage of the feathers from the selected birds (lack of brightness and poor order of barbs), possibly, because of the mite's presence. Similar findings were described by Faccini and collaborators on a hatchery located in the state of Minas Gerais, Brazil. These authors identified broken feathers, with disorganized or missing barbs and skin rash on a total of 285 subjects older than 13 months. *S. bicaudatus* mites were identified on feathers of such birds (12).

Feather mites have been reported in different countries around the world, in some cases depending on the severity of infestation, clinical signs are indicated such as loss of feathers and reduction of skin's quality (7,16,17). Despite of the above, the economic importance of the *S. bicaudatus* is still controversial in the ostrich industry. In other ratites like the Greater rhea (*Rhea americana*) ectoparasites were reported like the *Struthiolipeurus nandu*, which represent economic implications; this louse is located mostly on wings, slowing its host growth

(18). At the same time, there isn't enough epidemiological information to determine if *S. bicaudatus* can spread to other birds, such as, barnyard fowl or wild birds close to the ostrich production (12).

After performing diagnostic of mites, it was suggested to treat adult ostriches with Ivermectin or organophosphates with a recommended dose by other authors (7,10). However, it was also mentioned to the hatchery's owner, the importance to cycle these acaricides to avoid parasitic resistance, as it has become a more frequent phenomena in the last 30 years (19,20). In this study, ostriches younger than seven years and, juveniles (younger than three) were not part of the analysis because it wasn't allowed by the farmer, besides, at the time of sampling there were few birds of these ages.

This study is the first report of this species of mite on ostriches in Colombia and will lead to deepening the molecular diagnostic, obtaining genetic sequences and consolidation of taxonomical specific keys that will help with the classification of these types of mites.

Future studies are necessary for evaluating the biological cycle of this mite, encompassing the different stages of this bird (to verify the presence of the mite or to note if it only affects adults). Same way, these studies will help establish new control strategies and adequate management on ostriches' farms.

Conflict of interest

The authors declare that there are no conflicts of interests regarding the publication of this paper.

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