A REVIEW OF THE FELICOLA FELIS COMPLEX (MALLOPHAGA: TRICHODECTIDAE) FOUND ON NEW WORLD CATS (CARNIVORA: FELIDAE)

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Abstract.—Felicola felis (Werneck), found on Felis pardalis, and F. spenceri Hopkins, found on Felis canadensis, are redescribed and illustrated. Five new species of Felicola are described and illustrated: F. americanus on Felis rufa, F. braziliensis on Felis colocola, F. neofelis on Felis geoffroyi, F. sudamericanus on Felis tigrina, and F. similis on Felis yagouaroundi. A key is provided for identification of the seven species.

During the review by Emerson and Price (1981) of the species of Mallophaga found on mammals, we found that Felicola felis (Werneck, 1934) as defined by Werneck (1948) was actually a complex of five species found on New World cats. In addition, this complex includes F. spenceri Hopkins, 1960, as well as specimens of another new species we obtained from the Field Museum of Natural History, Chicago. It is our intent to describe and illustrate the two previously known species and the five new species found on wild cats of the New World and to provide a key for identification of these seven species. Felicola subrostratus (Burmeister, 1838), found on the domestic cat, an introduced species from Old World hosts, is not closely related to the Felicola felis complex.

All measurements are in millimeters. Scientific and common names of mammals are from Cabrera (1961), Emerson and Price (1981), Hall (1981), and Morris (1965). Paratypes of new species described will be distributed, as quantities permit, to the collections of the authors, the National Museum of Natural History, Washington, D.C., and the British Museum (Natural History), London.

Felicola felis (Werneck)
Figs. 1–3

Trichodectes felis Werneck, 1934: 282. Type-host: “Felis chibigouazou” = Felis pardalis Linnaeus, the Ocelot.

Felicola felis (Werneck, 1934), Werneck, 1948: 223 (part).

Male.—External morphology and chaetotaxy as in Fig. 1. Head width, 0.39; head length, 0.35; pterothorax width, 0.36; abdominal width, 0.57; and total length, 1.11. Genitalia as in Fig. 2, width, 0.17; distal tips of endomera fused, not separated as illustrated by Werneck (1934); sac with numerous small spines.

Female.—External morphology and chaetotaxy as in Fig. 3. Head width, 0.42;
head length, 0.35; pterothorax width, 0.40; abdominal width, 0.59; and total length, 1.18. Shape and chaetotaxy of gonapophyses (Fig. 3) are unique.

Discussion.—The type-material consists of the holotype male, allotype female, and five female, three male paratypes, all from the type-host collected at "Rio Cuyaba, Mato-Grosso, Brasil." Werneck (1948) also recorded this species for specimens collected off Felis concolor Linnaeus, F. Geoffroyi D'Orbigny and Gervais, "Felis pajeros Araza" = F. colocola Molina, "Felis jaguarundi Fisher" = F. jaguaroundi Geoffroy, and "Lynx rufus (Schreber)" = F. rufa Schreber. We have studied paratypes of Felicola felis and specimens from other hosts listed by Werneck in his 1948 paper. The male from F. concolor (Werneck slide no. 1861) is damaged so that an assessment of its specific identity cannot be made without more specimens from the Cougar. Specimens from the other hosts will be discussed in detail elsewhere in this review.

Material examined.—1 ♀ and 1 ♂ paratypes (Werneck slides no. 1069 and 1075) and 1 ♀ from Felis pardalis collected June 19, 1948, San Pedro Yepocapa, Chimalt, Guatemala.

Felicola braziliensis Emerson and Price, New Species

Fig. 6

Felicola felis (Werneck, 1934), Werneck, 1948: 223 (part). Type-host: "Felis pajarus" = Felis colocola Molina, the Pampas Cat.

Male.—External morphology and chaetotaxy essentially as for F. sudamericanus (Fig. 8) but with 2 less setae on posterior margin of abdominal tergites and sternites II–IV. Shape of abdominal tergal and sternal plates as for F. felis (Fig. 1). Head width, 0.40; head length, 0.39; pterothorax width, 0.37; abdominal width, 0.56; and total length, 1.23. Genitalia, less sac, as in Fig. 6; width, 0.17; sac as for F. spenceri (Fig. 5) but without slender median sclerite.

Female.—External morphology and chaetotaxy essentially as for F. sudamericanus (Fig. 9) but with 2 less setae on posterior margin of abdominal tergites and sternites II–IV. Shape of abdominal tergal and sternal plates as for F. sudamericanus (Fig. 9). Head width, 0.41; head length, 0.39; pterothorax width, 0.40; abdominal width, 0.53; and total length, 1.27. Posterior margin of gonapophyses convex, each with 7 medium setae and with 4 smaller setae on ventral surface.

Discussion.—The general structure of F. braziliensis, including that of the male genitalia, is very close to that of F. felis. However, the shape of the endomeral plate of the male genitalia and the shape of the female gonapophyses separate the two species.

Material examined.—Holotype ♂ (Werneck slide no. 1729) and allotype ♀ (Werneck slide no. 1728) in collection of the Instituto Oswaldo Cruz, Rio de Janeiro, Brazil, with Werneck’s original labels of "Felis pajarus, Matto-Grosso, Brasil" being retained on each slide; 1 paratype (Werneck slide no. 1730), same data as holotype.

Felicola neofelis Emerson and Price, New Species

Fig. 7

Felicola felis (Werneck, 1934), Werneck, 1948: 223 (part). Type-host: Felis geoffroyi D'Orbigny and Gervais, the Geoffroy’s Cat.

Male.—External morphology and chaetotaxy as for F. felis (Fig. 1) except tergal and sternal abdominal plates shaped as for F. sudamericanus (Fig. 8). Head width,
Figs. 1–7. 1–3, Felicola felis. 1, Male. 2, Male genitalia. 3, Female. Figs. 4–7. Male genitalia (sac shown only on Fig. 5). 4, F. americanus. 5, F. spenceri. 6, F. braziliensis. 7, F. neofelis.

0.35; head length, 0.34; pterothorax width, 0.34; abdominal width, 0.53; and total length, 1.04. Genitalia, less sac, as in Fig. 7; width, 0.15; sac small and armed as for F. spenceri (Fig. 5) but with short median sclerite as for F. americanus (Fig. 4).

Female.—External morphology and chaetotaxy, including tergal abdominal plates, as for F. sudamericanus (Fig. 9); sternal abdominal plates smaller, but same shape, as for F. felis (Fig. 3). Shape of gonapophyses as for F. sudamericanus (Fig. 12) with 9 setae on posterior margin and 3 smaller setae on dorsal surface. Head width, 0.38; head length, 0.36; pterothorax width, 0.36; abdominal width, 0.55; and total length, 1.14.

Discussion.—The shape of the male genitalic endomeral plate and female gonapophyses allies F. neofelis with F. braziliensis and separates it from F. felis.
Felicolina neofelis may be recognized from those two species by its smaller dimensions in both sexes and by the different shape of the opening in the male endomeral plate and of the female abdominal tergal plates.

Material examined.—Holotype ♀ (Werneck slide no. 444) and allotype ♂ (Werneck slide no. 443) in collection of the Instituto Oswaldo Cruz, Rio de Janeiro, Brazil, with Werneck’s original labels “Felis Geoffroyi, Russas-Ceara, Brasil.”

_Felicola spenceri_ Hopkins

Fig. 5

_Felicola_ (Felicolina) _spenceri_ Hopkins, 1960: 80. Type-host: _Lynx canadensis_ Kerr = _Felis canadensis_ (Kerr), the Lynx.

Male.—External morphology, including shape of abdominal tergal and sternal plates, as for _F. felis_ (Fig. 1). Chaetotaxy of abdominal tergites and sternites IV–VII each with 18 short setae. Head width, 0.46; head length, 0.45; pterothorax width, 0.42; abdominal width, 0.70; and total length, 1.51. Genitalia as in Fig. 5; width, 0.18.

Female.—External morphology, including shape of abdominal tergal and sternal plates, as for _F. felis_ (Fig. 3). Chaetotaxy of abdominal tergites and sternites IV–VII each with 10 short setae. Head width, 0.49; head length, 0.46; pterothorax width, 0.48; abdominal width, 0.78; and total length, 1.64. Gonapophyses as for _F. sudamericanus_ (Fig. 12).

Discussion.—The male of _F. spenceri_ is readily distinguished from that of the preceding three species by the separated distal tips of the genitalic endomeral plate; the female is recognized by the combination of its large dimensions and shape of the gonapophyses.

Material examined.—6 paratypes from _Felis canadensis_ collected in British Columbia, Canada.

_Felicola americanus_ Emerson and Price, New Species

Fig. 4

_Felicola felis_ (Werneck, 1934), Werneck, 1948: 223 (part). Type-host: _Felis rufa_ (Schreber), the Bobcat.

Male.—External morphology near that of _F. sudamericanus_ (Fig. 8). Abdominal tergal plates III–VIII shaped as in Fig. 8, but each with 22 postero marginal setae. Abdominal sternal plates III–VII shaped as for _F. sudamericanus_ (Fig. 8), each with 20 postero marginal setae. Head width, 0.39; head length, 0.37; pterothorax width, 0.34; abdominal width, 0.59; and total length, 1.28. Genitalia, less sac, as in Fig. 4; width, 0.15; sac as for _F. felis_ (Fig. 2).

Female.—External morphology as for _F. felis_ (Fig. 3) except abdominal tergal and sternal plates III–VII wider and not as long. Abdominal tergal plates IV–VIII each with 20 postero marginal setae. Abdominal sternal plates IV–VII each with 14 postero marginal setae. Gonapophyses with convex posterior margin, as for _F. sudamericanus_ (Fig. 12), each with 9 marginal setae. Head width, 0.43; head length, 0.39; pterothorax width, 0.42; abdominal width, 0.69; and total length, 1.43.

Discussion.—The genitalic features of _F. americanus_ ally this species with _F. spenceri_, thereby separating both from the first three species; _F. americanus_ differs
from *F. spenceri* by its smaller size, its shorter endomeral plate, and smaller genital sac sclerite. The female of *F. americanus* is less distinctive but recognizable by its dimensions, gonapophysis shape, and tergal morphology.

Material examined.—Holotype ♂ and allotype ♀ from *Felis rufa* collected March 3, 1937, Raymondville, Texas (37-6414). These specimens were examined by Werneck (1948) and they are in the National Museum of Natural History. 7 paratypes from *F. rufa* collected March 4, 1971, Ravalli County, Montana.

_Felicola sudamericanus* Emerson and Price, New Species
Figs. 8–12

Type-host.—*Felis tigrina pardinoides* Gray, the Tiger Cat or Little Spotted Cat.

Male.—External morphology and chaetotaxy as in Fig. 8. Head width, 0.36; head length, 0.31; ptero thorax width, 0.33; abdominal width, 0.54; and total length, 1.15. Terminal abdominal segments as in Fig. 10. Genitalia as in Fig. 11; width, 0.14.

Female.—External morphology and chaetotaxy as in Fig. 9. Head width, 0.40; head length, 0.34; ptero thorax width, 0.39; abdominal width, 0.66; and total length, 1.33. Terminal abdominal segments as in Fig. 12.

Discussion.—The shape of the genitalic endomeral plate of the male *F. sudamericanus*, including the protruding anterior border without a median indentation and the slender pointed posterior tips, is different from that of any of the five preceding species. The female of *F. sudamericanus* is recognizable by the combination of dimensions, shape of the gonapophyses and abdominal tergal plates, and the armature of the vulval surface.

Material examined.—Holotype ♂, allotype ♀, and 10 paratypes collected from *Felis tigrina pardinoides* (KVS 23397) on December 7, 1958, at Cavca, Malvasi, Colombia. Holotype and allotype are in the Field Museum of Natural History.

_Felicola similis* Emerson and Price, New Species
Figs. 13–16


*Felicola felis* (Werneck, 1934), Emerson and Price, 1975: 52. Type-host: *Felis yagouroundi* E. Geoffroy, the Jaguaroundi.

Male.—External morphology and chaetotaxy as in Fig. 14. Head width, 0.40; head length, 0.33; ptero thorax width, 0.34; abdominal width, 0.54; and total length, 1.21. Genitalia as in Fig. 16: width, 0.13.

Female.—External morphology and chaetotaxy as in Fig. 13. Head width, 0.41; head length, 0.40; ptero thorax width, 0.40; abdominal width, 0.63; and total length, 1.39. Vulval region as in Fig. 15.

Discussion.—The male of *F. similis* is separable from all other known species of the complex by the size of the genitalia and details of its endomeral plate. The female of *F. similis* is recognized from all others by its gonapophysis shape and chaetotaxy.

Material examined.—Holotype ♂ and allotype ♀ from *Felis yagouroundi* (PCT 339) collected on October 1, 1973 at Juan de Zalazar, Boquero, Paraguay. Paratype ♂ (Werneck slide no. 1659) and paratype ♀ (Werneck slide no. 1656) in collection of the Instituto Oswaldo Cruz, Rio de Janeiro, Brasil, with Werneck’s
original labels "Felis jaguarundi, Palma-Goyaz-Brasil." 29 paratypes and 4 immature specimens from the same host collected June 6, 1968, Mata de Bejuca, Maturin, Monagas, Venezuela (43662).

**Key to New World Species of the *Felicola felis* Complex**

**Males**

1. Endomeral plate with separated distal tips and without median indentation on anterior margin .......................... 2
Figs. 13–16. *Felicola similis*. 13, Female. 14, Male. 15, Female ventral terminalia. 16, Male genitalia.
- Endomeral plate with fused distal tips and with median indentation on anterior margin ........................................ 5
2. Distal tips of endomeral plate pointed (Fig. 11) ................................................................. *sudamericanus*, new species
- Distal tips of endomeral plate rounded ............................................................. 3
3. Anterior margin of endomeral plate flat (Fig. 4) .......................................................... *americanus*, new species
- Anterior margin of endomeral plate angular ......................................................... 4
4. Endomeral plate not extending beyond tip of fused parameres (Fig. 16); short sclerite associated with genital sac; genitalia smaller, width 0.13 ......................................................... *similis*, new species
- Endomeral plate extending slightly beyond tip of fused parameres (Fig. 5); long sclerite associated with genital sac; genitalia larger, width 0.18 ........................................ *spenceri* Hopkins
5. Opening in endomeral plate with parallel sides (Fig. 7) .................................................. *neofelis*, new species
- Opening in endomeral plate expanded in posterior portion ....................................... 6
6. Anterior margin of endomeral plate flat (Fig. 2) ...................................................... *felis* (Werneck)
- Anterior margin of endomeral plate protruding anteriorly (Fig. 6) ............................ *braziliensis*, new species

**FEMALES**

1. Shape of gonapophyses as in Figs. 3 or 15 ................................................................. 2
- Shape of gonapophyses as in Fig. 12 .......................................................... 3
2. Marginal setae distributed evenly on gonapophyses (Fig. 15); total length, 1.39 ................................................................. *similis*, new species
- Marginal setae distributed unevenly on gonapophyses (Fig. 3); total length, 1.18 ................................................................. *felis* (Werneck)
3. Large species, total length more than 1.60 ...................................................... *spenceri* Hopkins
- Smaller species, total length less than 1.50 .................................................. 4
4. Shape of abdominal tergal plates as in Fig. 3 ......................................................... 5
- Shape of abdominal tergal plates as in Fig. 9 .................................................. 6
5. Total length more than 1.40 ................................................................. *americanus*, new species
- Total length less than 1.20 ................................................................. *neofelis*, new species
6. Surface of vulva armed with short spines (Fig. 12); total length, 1.33 ................................................................. *sudamericanus*, new species
- Surface of vulva unarmed (Fig. 3); total length, 1.27 ................................................................. *braziliensis*, new species

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