



EGYPTIAN ACADEMIC JOURNAL OF
BIOLOGICAL SCIENCES
ENTOMOLOGY

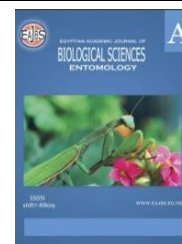
A



ISSN
1687-8809

WWW.EAJBS.EG.NET

Vol. 15 No. 4 (2022)



Ectoparasites Associated with Desert Raven *Corvus ruficollis*, Lesson, 1831 at the Eastern Desert, Red Sea, Egypt

Saber A. Riad

Ecology Lab., Department of Zoology and Entomology, Faculty of Science, Al-Azhar University, Cairo, Egypt.

E-mail: Saberriad60@azhar.edu.eg

ARTICLE INFO

Article History

Received:21/8/2022

Accepted:16/10/2022

Available:18/10/2022

Keywords:

Desert raven,

lice, Eastern

Desert,

Ectoparasites,

Mites, Ticks.

ABSTRACT

Egypt is characterized by many deserts associated with cities. The desert raven is considered an ancient one of the most abundant birds in the Egyptian desert and is susceptible to a wide range of ectoparasites. therefore, the present study was to identify the ectoparasites that infect brown-necked raven *Corvus ruficollis* in Wadi Dara, Eastern Desert, Red Sea Governorate, Egypt. During the two years from 2020 to 2022, several parasites were collected from a brown-necked raven. Sixteen live brown-necked ravens and nine nests in the Red Sea governorate were investigated. The collected ectoparasites were thirteen lice species belonging to two suborders, four dipteran species belonging to two families, ten mite species belonging to two families, also nine tick species belonging to two families. Generally, ectoparasites are considered the primary cause of many dangerous effects for many domestic and migratory bird species, the presence of the brown-necked ravens in the bird migration route in the eastern desert increases the chance of ectoparasites transmission between different species in the same area.

INTRODUCTION

Egypt is characterized by a wide diversity of birds, including wild and migratory birds. Egypt is considered one of the very important migration routes of birds between breeding sites and Africa (Riad, 2022 and Hamada, *et al.*, 2022).). The raven was mentioned in the Qur'an and the Bible, it is considered an ancient bird from the earth's time. *Corvus ruficollis*, Lesson,1831 (desert or brown necked raven) inhabits a territory ranging from its native Afghanistan; Iraq; Jordan; Islamic Republic of Iran; Kazakhstan; Kuwait; Pakistan; Oman; Palestinian; Saudi Arabia; Turkmenistan; Syrian Arab Republic; Tajikistan; United Arab Emirates; Western Sahara; Uzbekistan; Yemen; Algeria; Tunisia; Cape Verde; Burkina Faso; Chad; Egypt; Djibouti; Eritrea; Kenya Somalia; Sudan; Senegal; Ethiopia; Libyan Arab Jamahiriya; Mauritania; Mali; Morocco; Nigeria; Niger (Kristan, *et al.*, 2004).

Family Corvidae includes Crows, Magpies, and Jays. These birds are from small to large birds in size. The plumage is black and white or black or green, blue, yellow, brown, purple, gray, or white and black in bold patterns. Male and females in most ravens are similar. The beak is very strong, short, medium, slender, or curved in some species, its colors may be yellow or bright red. Raven wings are medium or long and apically rounded and have strong medium to large legs. The brown-necked raven, flies well, walks, perches,

hopper, and lives in cup-shaped nests made by sticks in a tree (Kristan, *et al.*, 2004; Riad, *et al.*, 2019). Typically, the lifespan of ravens is about ten to fifteen years in the wild (El-Negumi *et al.*, 1950). In Egypt, the brown-necked raven inhabits the eastern desert district and is mainly recorded in areas associated with coastal cities, lakes, Suez Canal, also, palm, and acacia trees distributed in the desert. Ravens are omnivorous eaters and use these places and plants as a source of food items, shelter, and water source (Khalil *et al.*, 2011).

Ectoparasites such as ticks, mites, fleas, bugs, chewing lice, etc. infect all birds, especially feather chewing lice and mites. Larval and adult stages of ectoparasites and some flies parasitizing on domestic, migratory, and wild birds (Chege *et al.*, 2014).

Petney *et al.* (2017) recorded around 900 tick species around the world. Many parasites and rickettsial diseases are transmitted by ticks (Estrada-Pena *et al.*, 2004; Bursali *et al.*, 2012; Dik *et al.*, 2015; Keskin and Erciyas-Yavuz, 2016; Keskin and Erciyas-Yavuz, 2019). The larvae and adults of Ixodidae species live in mammals and reptiles, and birds (Karaer *et al.*, 1994). In wild birds, the different lice species are commonly seen, especially herons, ravens, and egrets (Dik *et al.*, 2013; Dik *et al.*, 2017). Also, ectoparasite insects belonging to Sarcophagidae, Calliphoridae and Hippoboscidae were recorded in some migratory and wild birds (Catts and Mullen, 2002; Little, 2008). This study aims to collect and classify the ectoparasites; ticks, mites, and insects associated with the wild brown-necked raven in the Eastern Desert in Egypt.

MATERIALS AND METHODS

The current study was conducted on the brown-necked ravens *Corvus ruficollis* and its nests that were discovered in the study area at Wadi Dara located between 110 km north of Hurgada city and 40 km south of Ras Ghareb city, Eastern Desert, Red Sea, Egypt (Fig. 1), the specimens collected between February 2020 to February 2022. During this period, prepared traps were used to collect and hunt the live ravens, using 4 traps 16 live, brown-necked ravens were collected, and 9 nests were examined (Fig 1). By the author, all birds were examined systematically to collect the ectoparasites. By careful examination of the feathers, the birds were examined morphologically. Using forceps, all large ectoparasites were collected and stored in alcohol 70%. The identification of collected samples of ectoparasites was in the Ecology lab of the Department of Zoology, Faculty of Science, Al-Azhar University and Department of Parasitology, Faculty of Veterinary Medicine, Sues Canal University. Also, Mite species were isolated and identified at the Institute of Plant Protection, Cairo, Egypt.

Extraction of the mites

Some feathers were removed from different parts of the body of the live brown-necked raven and feces from nests then put in Tullgren funnels for one day. According to Krantz and Walter (2009) each funnel has an electric lamp. Different stages of mites were removed using a camel hairbrush or by dissecting needles, then samples were transferred to Petri-dishes. Using the stereoscopic binocular extracted contents were examined, and skin mites were carefully collected by needles and examined using a stereomicroscope. To prepare mites, mite samples were cleared with Nesbitt's solution. Using Hoyer's medium on glass slides extracted samples were mounted. The slides were heated by a hot plate at 40° C to clear. Finally, Labels included all data were fixed to each slide.

Nomenclature of brown necked raven according to Gill *et al.* (2022). Ectoparasites identification depended upon; Price *et al.* (2003) in lice identification, Hutson (1984) in Hippoboscidae identification, Zumpt (1965) in larvae of Diptera identification, Pfaffle *et al.* (2017) in ticks identification, Takehara *et al.* (2019) and Bhowmick *et al.* (2019) in the identification of *Ornithonyssus bursa* and others; Bequaert (1954), Clay

(1958), Price and Beer (1963), Nelson and Price (1965), Clayton (1990), Estrada-Pena *et al.* (2004), Pfaffle *et al.* (2017).

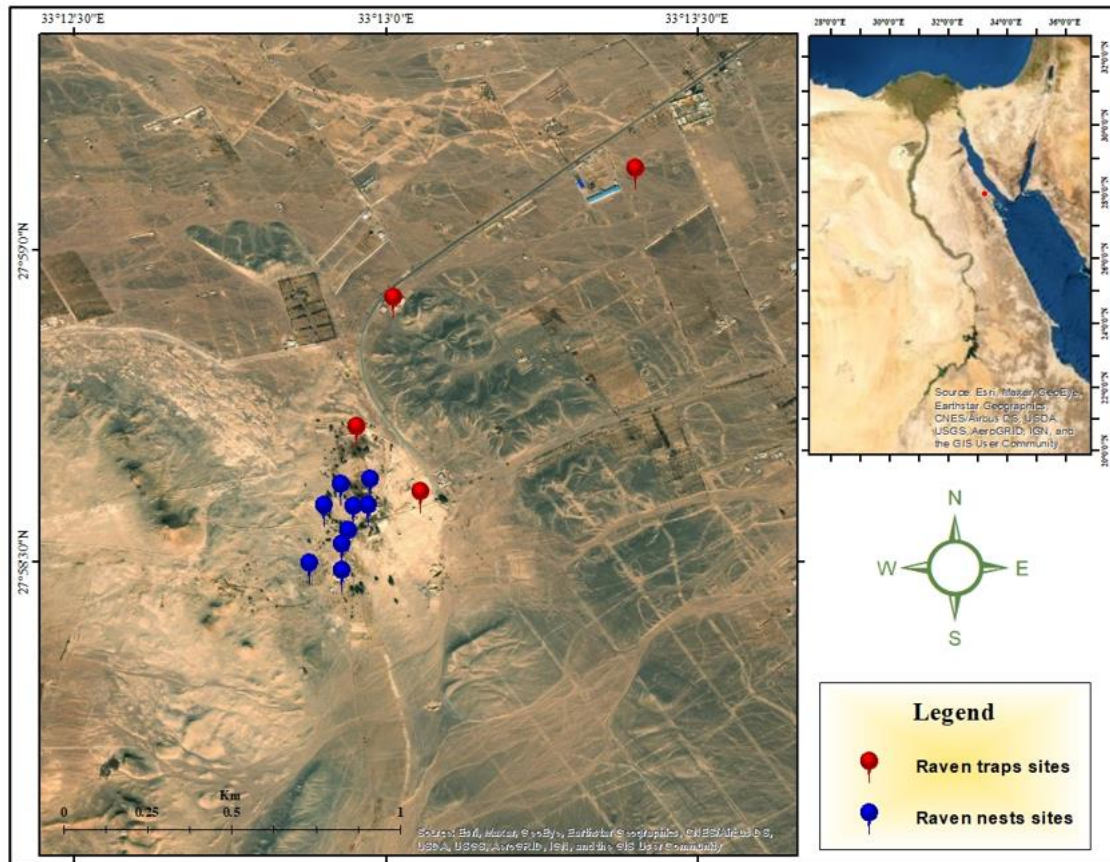


Fig. 1. Raven traps and nest locations used in the current study, Wadi Dara, Eastern Desert, Egypt.

RESULTS

During the current study, 16 birds of brown-necked raven and nine raven's nests were examined. The results show the most numbers of ectoparasites species belonged to the Mallbophaga order represented by 13 species as the following: Five species of suborder Amblyceran and eight species of suborder Ischnoceran collected from ravens and nests samples. While recorded 10 species from order Ixodida as the following: 6 species of family Ixodidae and 4 species of family Argasidae and recorded 9 species from Order Mesostigmata as the following: 3 species of family Macronyssidae, 3 species of family Rhinonyssidae, two species of family Knemidocoptidae, and one species of family Feryanidae. Dipterans ectoparasites represented by family Callophoridae 3 species and Hippoboscidae one species only.

Mites Associated with The Brown-Necked Raven:

Nine ectoparasite mite species belonging to four families were collected from ravens. The Macronyssidae family was represented by three species: *Ornithonyssus bursa*, *Ornithonyssus sylviarum* and *Ornithonyssus sp.* Also, the Rhinonyssidae family was represented by three species; *Rhinonyssus colymbicola*, *Rhinonyssus sp.*, and *Sternostoma framcheacolam*, and two species of Knemidocoptidae family as the following: *Kenonemidocoptes sp.* and *Neonemidocoptes gallina*. finally, *Freyana largifolia* belonging to Feryanidae family was recorded (Table 1).

Table 1. Mites associated with a brown-necked raven at Eastern Desert, Egypt.

Class	Order	Suborder / Family	Scientific name	Examined material
Arachnida	Mesostigmata	Macronyssidae	<i>Ornithonyssus bursa</i> <i>Ornithonyssus sylviarum</i> <i>Ornithonyssus sp</i>	Skin
		Knemidocoptidae	<i>Kenonemidocoptes sp.</i> <i>Neonemidocoptes gallina</i>	Skin and nests
		Feryanidae	<i>Freyana largifolia</i>	Skin
		Rhinonyssidae	<i>Rhinonyssus colymbicola</i> <i>Rhinonyssus sp.</i> <i>Sternostoma framcheacolam</i>	Nasal cavity

Ticks Associated with The Brown-Necked Raven:

Ten ectoparasite tick species belonging to two families were collected from ravens. Ixodidae family was represented by six species: *Haemaphysalis parva*, *Hayalomma marginatum*, *Hyalomma sp.*, *Ixodes frontalis*, *Ixodes sp.*, and *Rhipicephalus guihoni* (Table 2). On the other hand, The Argasidae family was represented by four species; *Argas hermanni*, *Argas persicus*, *Argas sp.*, and *Ornithodoros coniceps* (Table 2).

Table 2. Ticks associated with Brown-necked Raven at Eastern Desert, Egypt.

Class	Order	Suborder / Family	Scientific name	Examined material
Arachnida	Ixodida	Ixodidae	<i>Haemaphysalis parva</i> <i>Hayalomma marginatum</i> <i>Hyalomma sp.</i> <i>Ixodes frontalis</i> <i>Ixodes sp.</i> <i>Rhipicephalus guihoni</i>	Feathers, skin, and nests
		Argasidae	<i>Argas hermanni</i> <i>Argas persicus</i> <i>Argas sp.</i> <i>Ornithodoros coniceps</i>	Feathers, skin, and nests

Flies And Lice Associated with The Brown-Necked Raven:**The Identified Flies Belonged to Two Families:**

Four ectoparasite fly species belong to two families. The Calliphoridae family was represented by three species: *Calliphora vicina*, *Calliphora sp.*, and *Lucilia sericata*. The Hippoboscidae family was represented by one species: *Pseudolynchia canariensis* (Table 3).

The Identified Lice Belong to Two Suborders:

Thirteen ectoparasite lice species belong to two suborders. The Amblycera suborder was represented by five species: *Laemobothrion tinnunculi*, *Laemobothrion sp.*, *Menopos sp.*, and *Piagetiella titan* (Table 3). Also, The Ischnocera suborder was represented by eight species: *Columbicola bacillus*, *Columbicola sp.*, *Degeeriella fulva*, *Degeeriella sp.*, *Gonoides oustralis*, *Heptapsogaster sp.*, *Pectinopygus forficulatus*, and *Philopterus residus* (Table 3).

Table 3. Flies and lice associated with Brown-necked Raven at Eastern Desert, Egypt.

Class	Order	Suborder / Family	Common Name	Scientific name	Examined material
Insecta	Diptera	Calliphoridae	Flies	<i>Calliphora vicina</i> <i>Calliphora sp.</i> <i>Lucilia sericata</i>	Skin, wounds, and nests
		Hippoboscidae	louse flies	<i>Pseudolynchia canariensis</i>	Feathers and nests
	Mallbophaga	Suborder: Amblycera	Chewing lice	<i>Laemobothrion tinnunculi</i> <i>Laemobothrion sp.</i> <i>Menopos sp.</i> <i>Piagetiella titan</i> <i>Ricinus sp.</i>	Feathers and Skin
		Suborder: Ischnocera	Chewing lice	<i>Columbicola bacillus</i> <i>Columbicola sp.</i> <i>Degeeriella fulva</i> <i>Degeeriella sp.</i> <i>Gonoides oustralis</i> <i>Heptapsogaster sp.</i> <i>Pectinopygus forficulatus</i> <i>Philopterus residus</i>	Feathers and Skin

DISCUSSION

Few studies conducted in Egypt have examined species of wild birds and brown-necked raven for the detecting of ectoparasitic insects and arachnid species. Generally, ectoparasites are considered the primary cause of many dangerous effects for many domestic and migratory bird species, the presence of the brown-necked ravens in the bird migration route in the eastern desert increases the chance of ectoparasites transmission between different species in the same area (Riad, 2022 and Hamada, *et al.*, 2022). Our study revealed the presence of ectoparasitic found in wild brown-necked ravens was like those collected from domestic bird species (ducks, chicken, turkey hen, and pigeon) that are bred near ravens nesting. In general, obtained data agree with Metwally *et al.* (2019). The number of mite species collected from brown-necked raven was 4 families and 9 species. This data on mites species agreed with those collected by many researchers from domestic and wild birds during the last years; Fain and Philips (1977); Fain *et al.* (1977); Rakha (1980); El-Kammah *et al.* (1982); Hoogstraal (1984), El-Kammah *et al.* (1990), Abd-Allah (1993), Fain and drugmand (1993), Gaud (1996); Fan (2000); Fan and Zhang (2004); El-Kammah (2007); Abdel-Gawad (2008).

Also, the ticks recorded on wild brown-necked ravens were 2 families, 10 species. This data on tick species agreed with those collected by many researchers from domestic and wild birds during the last years; Hoogstraal (1956); Taylor *et al.* (1966); El-Kammah *et al.* (1982); Hoogstraal (1984); El-Kammah *et al.* (1990); El-Kammah (2007); Guglielmone *et al.* (2010).

On the other hand, ectoparasitic insect species recorded as parasitic on brown-necked raven were 2 orders, 2 suborders, 4 families, and 17 species. This data on parasitic insect species agreed with those collected by many researchers from domestic and wild birds during the last years; Rekasi (1979); Lyal (1985); Beaucournu (1986).

Riad (2022) recorded some ectoparasites can be infested the wild birds and collected some ectoparasites from the migratory soaring birds in the Eastern Desert of Egypt. The parasitic species collected from migratory birds belonged to Ciconiiformes, Accipitriformes, Falconiformes, Columbiformes, Coraciiformes, Pterocliiformes, and

Suliformes bird orders, and like those collected from the raven in the same area. Also, agreed with Dik *et al.* (2013); Dik *et al.* (2015); Dik *et al.* (2017); Hamada, *et al.*, (2022).

Also, Riad (2022) showed the presence of some species of mite belonging to the Macronyssidae family, four lice species belonging to the Ischnocera suborder, and Amblycera suborder, and one maggot species belonging to the Calliphoridae family on some samples of Cattle Egret in the Eastern Desert. Parasitic species of *Anaticola phoenicopterid*, *Ardeicola ciconiae*, *Neophilopterus incompletus*, *Ciconiphilus quadripustulatus*, *Calliphora sp.*, *Pseudolynchia canariensis* recorded in a brown necked raven in the present study.

Unfortunately, a few numbers of raven samples were used during the current study. This is related to the difficulty of collecting live crow samples and reaching nests in tall trees which reduced the live sample used in the current study. Therefore, we could not able to calculate both the abundance and the intensity of ectoparasites in this work.

The current study was one of the few field studies on ectoparasites associated with the brown-necked raven in the eastern desert and red sea governorate in Egypt and presented to shed light on ectoparasites on brown necked raven in the wild in Egypt.

CONCLUSION

Brown-necked ravens are infected by ectoparasites that infect other wild, domestic, and migratory bird species as well. During the current study, the most dominant parasitic species (thirteen species) were collected from louse species belonging to Amblycera and Ischnocera suborders, followed by ten species of ticks Ixodida, and nine mites belonging to Mesostigmata. Also, the results show the chewing lice were most seen as the following: 5 Ambylceran and 8 Ischnoceran in brown-necked raven.

ACKNOWLEDGMENT

I would like to thank the members of the EEAA researchers who participated and contributed to the collecting of the birds and the collection of ectoparasites, volunteer zoology students from Al-Azhar University, the researchers in the Department of Parasitology, Faculty of Veterinary Medicine of Sues Canal University, for the isolation and identification of parasites. Finally, the plant protection institute for helping to identify arachnids and all forms of support.

REFERENCES

- Abd-Allah, A. A. (1993): Studies on Some Mites Inhabiting Wild Birds. MSc. Thesis, Faculty of Agriculture. Al-Azhar University., 209 pp.
- Abdel-Gawad, A. M. (2008): Studies on Some Mites Associated with Some Birds in Egypt. PhD. Thesis, Zoology Department. Fac. Scien. Al-Azhar Univ. (Girls). 424 pp.
- Beaucournu, J. C. and Aubert, M. F. (1986): About Mallophagous wild carnivores in France (Mallophagous: Trichodectiidae). *Bulletin of the French Society of Parasitology*, 4, 273-277.
- Bequaert, J. C. (1954): The Hippoboscidae or Louse-Flies (Diptera) of mammals and birds. Part II. Taxonomy, evolution and revision of American genera and species. *Entomological Americana*, 34: 1-232.
- Bhowmick, B.; Zhao, J.; Tianlin, B.; Liao, C. and Han, Q. (2019): Molecular characterization and genetic diversity of *Ornithonyssus sylviarum* in chickens (*Gallus gallus*) from Hainan Island, China. *Parasites & Vectors*, 12: 553. doi. org/10.1186/s13071-019-3809-9
- Bursali, A.; Keskin, A. and Tekin, S. (2012): A review of the ticks (Acari: Ixodida) of Turkey: species diversity, hosts, and geographical distribution. *Experimental and Applied Acarology*, 57: 91-104.

- Catts, E. P. and Mullen, G. R. (2002): Myiasis (Muscoidea, Oestroidea). *Medical and Veterinary Entomology*, pp. 317-348. Elsevier Sci. (USA).
- Chege, H. W.; Kemboi, D. C.; Bebora, L. C.; Maingi, N.; Nyaga, P. N.; Mbutia, P. N.; Njagi, P. G. and Githinji, J. (2014): Chicken parasites and local treatments used against them in Mbeere District, Kenya. *Livestock research for rural development*, 26, 2528.
- Clay, T. (1958): Revisions of Mallophaga Gen. Degeeriella from Falconiformes. *Bulletin of British Museum (National History) Entomology*, 7 (4): 123-207.
- Clayton, D. H. (1990): Host specificity of Strigiphilus owl lice (Ischnocera: Philopteridae), with the description of new species and host associations. *Journal of Medical Entomology*, 27: 257-265.
- Dik, B.; Albayrak, T.; Adanır, R. and Uslu, U. (2013): Lice species (Phthiraptera; Ischnocera, Amblycera) found in some songbirds (Aves: Passeriformes). *Kafkas University Faculty of Veterinary Journal*, 19 (5): 755-760.
- Dik, B.; ErciyasYavuz, K. and Per, E. (2017): Chewing lice (Phthiraptera: Amblycera, Ischnocera) on birds in Kızılırmak Delta, Turkey. *Journal of Veterinary Medicine*, 167 (1-2): 53-62.
- Dik, B.; Per, E.; Erciyas-Yavuz, K. and Yamaç, E. (2015): Chewing lice (Phthiraptera: Amblycera, Ischnocera) species found on some birds in Turkey, with new records and new host. *Turkish Journal of Parasitology*, 39: 790-798.
- El Kammah, K. M. (2007): Tick and parasitic. MSc. Faculty of Agriculture Cairo University, 153pp.
- El Kammah, K. M.; Hamdy, B. H. and Saoudi, O. (1982): The influence of ectoparasitic (ticks and mites) on host serum enzymes. *Journal of Egypt Society of Parasitology*, 12 (1), 71-79.
- El Kammah, K. M.; Oyom, L. M.; Madbouly, M. H. and Habeeb, S. M. (1990): Morphological description of the chicken mite Ornithonyssus bursa (Berlese, 1888) (Dermanyssidae) from Egypt. *Bulletin of Egyptian Society of Entomology*, 69, 295-304.
- El-Negumi, A.; Zain ElDin. H. F.; El-Monery, M. A. and Fayed, M. K. (1950): Birds of Egypt. 2nd Edition; Daar El-Fikr El-Arabi, Cairo, Egypt
- Estrada-Pena, A.; Bouattour, A.; Camicas, J. L. and Walker, A. R. (2004): Ticks of domestic animals in the Mediterranean region: a guide to identification of species. *University of Zaragoza Press*, 50001-Zaragoza, Spain.
- Fain, A. and drugmand, D. (1993): Notes on the genus Hexatbrombium Cooreman 1944 (Acari: Trombidiidae) with description of a few tribes and species from Afrotropical staphylinidae (coleoptera). *Bulletin and Annals of the Royal Belgian Entomological Society*, 129, 121-128.
- Fain, A. and Philips, J.R. (1977): Astigmatic mites from nests of birds of prey in U.S.A., description of four new species of Glycyphagidae. *International Journal Acarology*, 3, 105- 14.
- Fain, A.; Hyland, K. E. and Aitken, T. H. (1977): Flower mites of the family Ascidae phoretic in nasal cavities of birds (Acarina: Mesostigmata) *Portal of Journals on Health Sciences*, 69, 99-154.
- Fan, Q. H. (2000): The morphology of Xenocaligonellidus smileyi (Acari: Xenocaligonellidae). In systematic and faunistic research on Chinese insects, ed. B. K. Zhang Yalin. 290-297.
- Fan, Q. H. and Zhang, Z. Q. (2004): Revision of Rhizoglyphus Claparede (Acari: Acaridae) of Australia and Oceania. London.
- Gaud, J. (1996): Feather mites of the world (Acarina: Astigmata). *The superspecific taxa*.

- Ann. Mus. Royal Afr. Cent. Sci. Zool.*, 277, 1-436.
- Gill, F. D.; Donsker, and Rasmussen, P. (Eds). (2022). IOC World Bird List (v12.2). doi :10.14344/IOC.ML.12.1.
- Guglielmone, A. A.; Robbins, R. G.; Apanasevich, D. A.; Petney, T. N.; Pena, A. E.; Horak, I. G.; Shaa, R. and Barker, S. C. (2010): The Argasidae, Ixodidae and Nuttalliae (Acari: Ixodidae) of the world. A list of valid species names. *Zootaxa*, 2528, 1–28.
- Hamada, A.; El gebaly, O.; El Khayat, M. and Riad, S. A. (2022): Impact of Wind Energy Projects on Bird Migration, Gabel Al-Zeit - Eastern Desert, Egypt. *Catrina*, 25(1): 51-58
- Hoogstraal, H. (1956): African Ixodidae and Ticks of the Sudan. *Bur. Med. Surg. U.S. Navy* 1, 1101pp.
- Hoogstraal, H. (1984): Ticks and mites in. disease transmission. Hunter's tropical medicine, by G. T. Strickland 6. Ed., W. B. Saunders Co., Philadelphia, P. A. Chap. 101, 896-903.
- Hutson, A. M. (1984): Keds, flat-flies and bat-flies. Diptera, Hippoboscidae and Nycteribiidae. In "Handbooks for the identification of British insects". *Royal Entomological Society of London*, 10 (2): 40-41.
- Karaer, Z.; Yukarı, B. A. and Aydın, L. (1994): Turkey ticks and vectors. Arthropod diseases and vectors in Parasitology. *Turkish Parasitology Association*, 363-434.
- Keskin, A. and Erciyas-Yavuz, K. (2019): Ticks (Acari: Ixodidae) parasitizing Passerine birds in Turkey with new records and new tick-host associations. *Journal of Medical Entomology*, 56 (1): 156-161. DOI: 10.1093/jme/tjy151
- Keskin, A. K. and Erciyas-Yavuz, A. (2016): preliminary investigation on ticks (Acari: Ixodidae) infesting birds in Kizilirmak delta, *Turkey Journal of Medical Entomology*, 53: 217–220.
- Kristan, A. E.; Boarman, W. I. and Crayon, J. (2004): Diet composition of common ravens across the urban-wildland interface of the west Mojave Desert. *Wildlife Society Bulletin*, 32 (1): 244-253
- Khalil M. F.; Shoukry N. M. and Morsy T. A. (2011): *Corvus r. ruficollis* (desert or brown necked raven): a reservoir host for zoonotic parasites in Egypt. *Journal of Egypt Society of Parasitology*, 41 (3): 745–756
- Krantz, G. W. and Walter, D. E. (2009): A manual of Acarology. Texas Tec University. Third ed. 808 pp.
- Little, S. E. (2008): Myiasis in wild birds. In "Parasitic diseases of wild birds. Atkinson CT, Thomas NJ, Hunter DB (Eds.), pp. 546-556", John Wiley & Sons, Inc., Iowa, USA.
- Lyal, C. H.C. (1985): A Cladistic analysis and classification of trichodectid mammal lice (Phthiraptera: Ischnocera). *Bulletin of the British Museum. Bulletin of the British Museum (Natural History) Entomology*, 51, 187-346.
- Metwally, A. M.; Ahmed, A. M. and Amer, N. S. (2019): Ectoparasitic mites, ticks and lice of certain domestic birds at Gharbiya Governorate. *Al-Azhar Journal of Agricultural Research*, (44) 2: 202-213
- Nelson, R. C. and Price, R. D. (1965): The Laemobothrion (Mallophaga: Laemobothridae) of the Falconiformes. *Journal of Medical Entomology*, 2:249-257.
- Petney, T. N.; Pfaffle, M. P.; Sprong, H.; Mihalca, A. D. and EstradaPeña A. (2017): How to collect ticks and interpret these collections. In "Ticks of Europe and North Africa. A Guide to Species Identification. Estrada-Peña, A, Mihalca AD, Petney TN (eds), pp. 5-10", Springer International Publishing, Cham, Switzerland.
- Price, R. D. and Beer, J. R. (1963): Species of Colpocephalum (Mallophaga: Menoponidae)

- parasitic upon the Falconiformes. *The Canadian Entomologist*, 95: 731-763.
- Price, R. D.; Hellenenthal, R. A.; Palma, R. L.; Johnson, K. P. and Clayton, D. H. (2003): The Chewing Lice: World checklist and biological overview. *Illinois Natural History Survey Special Publicaion*, 24 x + 501 p.
- Rakha, M. A. (1980): Taxonomical and Biological Studies on Some Astigmatid Mites of Birds. PhD. Thesis, Faculty of Agriculture Cairo University. Egypt., 384 pp.
- Rekasi, J. (1979): The Mallophaga collection of the Hungarian Natural History Museum. II. *Parasitology Hungarica*. 12, 93-98.
- Riad, S. A. (2022): Ectoparasites Associated with Migratory Birds, Eastern Desert, Red Sea, Egypt. *Egyptian Academic Journal of Biological Sciences, B. Zoology*, 14(2), pp. 19-33. doi: 10.21608/eajbsz.2022.249312
- Riad, S. A; Al-Mongy, M; Abdullah, A. and Abdel-Halim, I. E. (2021): Recording of The Spring Migration of Soaring Birds Through Gebel El Zeit, Eastern Desert, Egypt. *Egyptian Journal of Zoology*, Vol. 75: 14-24
- Riad, S. A; Al-Mongy, M; and Abdel-Halim, I. E. (2019): Movement Patterns of the Black Kite (*Milvus migrans*) During Spring Migration over Rift Valley/Red Sea Flyway, Gulf of Suez. *Egyptian Academic Journal of Biological Science (B. Zoology)*, 11(3): 129-139. DOI: 10.21608/eajbsz.2019.65676
- Takehara, M.; Murata, M.; Katakura, K.; Fujisawa, S; Hmoon, M. M.; Win, S. Y.; Bawm, S.; Htun, L. L.; Aung, Y. H.; Win, M. M.; Isezaki, M.; Maekawa, N.; Okagawa, T.; Konnai, S. and Ohashi, K. (2019): Haematophagous mites on poultry farms in the Republic of the Union of Myanmar. *Heliyon*, e01544. doi: 10.1016/j.heliyon.2019.e01544
- Taylor, R. M.; Hurlbut, H. S.; Work, T. H.; Kingston, J. R. and Hoogstraal, H. (1966): Arboviruses isolate from Argas ticks in Egypt: *Quaranfil*, *Chenuda*, and *Nyamanini*. *American Journal of Tropical Medicine and Hygiene*, 15, 76-86.
- Zumt, F. (1965): Myiasis in man and animals in the old world. Butterwoths & Co. Ltd., London.

ARABIC SUMMARY

الطفيليات الخارجية المرتبطة بغراب الصحراء *Corvus ruficollis*, Lesson, 1831 في الصحراء الشرقية، البحر الأحمر، مصر

صابر عبد المنعم رياض

معمل البيئة، قسم علم الحيوان والحشرات - كلية العلوم - جامعة الأزهر - القاهرة - مصر.

تتميز مصر بالعديد من الصحاري المرتبطة بالمدن. يعتبر غراب الصحراء من أكثر الطيور وفرة في الصحراء المصرية وهو عرضة لمجموعة واسعة من الطفيليات الخارجية. لذلك، كانت الدراسة الحالية للتعرف على الطفيليات الخارجية التي تصيب الغراب بني العنق *Corvus ruficollis* في وادي دارا، الصحراء الشرقية، محافظة البحر الأحمر، مصر. خلال عامين من 2020 إلى 2022، تم جمع العديد من الطفيليات من الغراب بني العنق. تم فحص ستة عشر غراباً حياً وتسعة أعشاش بمحافظة البحر الأحمر. كانت الطفيليات الخارجية التي تم جمعها عبارة عن ثلاثة عشر نوعاً من القمل تنتمي إلى تحت رتبة، وأربعة أنواع من رتبة ثنائية الجناح وتنتمي إلى عائلتين، وعشرة أنواع من الحلم تنتمي إلى عائلتين، وتسعة أنواع من القراد تنتمي إلى عائلتين. بشكل عام، تعتبر الطفيليات الخارجية السبب الرئيسي للعديد من الآثار الخطيرة للعديد من أنواع الطيور الداجنة والمهاجرة، ووجود الغراب بني العنق في طريق هجرة الطيور في الصحراء الشرقية يزيد من فرصة انتقال الطفيليات الخارجية بين الأنواع المختلفة في نفس المنطقة