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Research article

Shrike predation on the lizard *Mesalina adramitana* in Qatar; a review of reported reptile and amphibian prey

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ABSTRACT

We report, for the first time, evidence of predation by a shrike (*Lanius* sp.) on the lizard *Mesalina adramitana*. This is the first record of predation by shrikes on lizards in Qatar. Whilst we did not directly observe the event, the presence of shrikes in the area and the method of impalement indicate shrikes as the predator. The lizard was found freshly impaled on a palm tree (*Phoenix dactylifera*), at 150 cm above ground. Bird species of the genus *Lanius* are well-known predators of lizards, and in arid environments reptiles are likely common prey for these birds. We provide a review of literature concerning predatory events by shrikes on reptiles and amphibians. We suggest inspection of shrubs for animals impaled by shrikes can improve biodiversity inventories, complementing other commonly used methods.

Keywords: reptile, *Lanius*, impaling behavior, predator prey interactions, biodiversity

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INTRODUCTION

Passerine birds of the genus *Lanius* display a predatory behavior similar to that of raptors.¹ Since shrikes do not possess the strong talons necessary for tearing small pieces from larger prey items, present in raptors, they have overcome this limitation by developing impaling behavior, using sharp objects, such as barbed wire, cacti, thorns and yucca¹⁻⁶. Impaling has several main functions: (i) to completely kill otherwise still living prey;⁷ (ii) to serve as a food storage strategy;⁸ (iii) to facilitate feeding on the impaled prey, thus compensating for the lack of talons; (iv) as advertisement, both of territory ownership to conspecifics and of male quality to female shrikes.⁶ Birds belonging to the genus *Lanius* comprise 29 extant species worldwide.⁹ Shrikes are reported to prey mainly on invertebrates, but also on a wide variety of vertebrates:⁶ amphibians and reptiles,¹⁰ birds and mammals,¹¹ including bats.¹² The importance of vertebrates as prey for shrikes varies largely according to the study. For example, for *L. collurio*, a migrant shrike species present in Qatar in late spring and early autumn,¹³ the proportion varied between 0-5%¹⁴⁻¹⁸, to 22% in a recent study in Italy where reptiles represented 12.5% of the observed prey.¹⁹ Bigger shrike species, like *L. meridionalis*, the only resident shrike in Qatar,¹³ hunts larger proportions of vertebrates.¹⁶ Predation of shrikes on some reptile species contributes to shaping morphological adaptations against predation. Thus, Young et al.²⁰ showed that loggerhead shrikes (*L. ludovicianus*) prey on flat-tailed horned lizard (*Phrynosoma mcallii*) with relatively shorter horns and that this source of mortality produces directional selection,



Figure 1. (a) Palm tree (*Phoenix dactylifera*) location of impaled lizard. (b) Freshly impaled adult male *Messalina adramitana*.

Table 1. Reported predation events of *Lanius* species on amphibians and reptiles. Information not provided in the literature is indicated by n.a.

<i>Lanius</i> species	Prey taxa	Prey species	Country	Support used for impaling	Source
<i>L. ludovicianus</i>	Amphibia, Urodela	<i>Ambystoma tigrinum</i>	USA	Barbed wire	31
<i>L. excubitor</i> / <i>L. meridionalis</i>	Amphibia, Anura	<i>Alytes obstetricans</i>	Spain	n.a.	26
<i>L. collaris</i>	Amphibia, Anura	<i>Ptychocephala adspersus</i>	Lesotho	n.a.	32
<i>L. collurio</i>	Amphibia, Anura	<i>Pelophylax esculentus</i> , <i>Rana temporaria</i>	Central Europe	n.a.	33
<i>L. collurio</i>	Amphibia, Anura	<i>Discoglossus galganoi</i>	Spain	n.a.	26
<i>L. ludovicianus</i>	Amphibia, Anura	<i>Pseudacris sierra</i>	USA	n.a.	7
<i>L. ludovicianus</i>	Amphibia, Anura	<i>Gastrophryne carolinensis</i> , <i>Hyla cinerea</i> , <i>H. squirella</i> , <i>Lithobates sphenoccephalus</i>	USA	n.a.	34
<i>L. ludovicianus</i>	Amphibia, Anura	<i>Hyla cinerea</i> , <i>Pseudacris crucifer</i>	USA	Barbed wire	35
<i>L. ludovicianus</i>	Amphibia, Anura	<i>Smilisca dentata</i>	Mexico	Barbed wire	36
<i>L. ludovicianus</i>	Amphibia, Anura	Frogs	USA	n.a.	12
<i>L. ludovicianus</i>	Amphibia, Anura	<i>Lithobates areolatus</i>	USA	Barbed wire	37
<i>L. ludovicianus</i>	Amphibia, Anura	<i>Lithobates blairi</i>	USA	Barbed wire and thorns	38
<i>L. ludovicianus</i>	Amphibia, Anura	<i>Acris crepitans</i>	USA	<i>Gleditsia triacanthos</i> , <i>Maclura pomifera</i>	6,38
<i>L. ludovicianus</i>	Reptilia, Testudines	<i>Chelydra serpentina</i>	USA	n.a.	38
<i>L. ludovicianus</i>	Reptilia, Testudines	<i>Malaclemys terrapin</i>	USA	n.a.	39
<i>L. ludovicianus</i>	Reptilia, Testudines	Turtle	USA	n.a.	12
<i>L. excubitor</i> / <i>L. meridionalis</i>	Reptilia, Serpentes	<i>Coronella</i> sp.	Spain	n.a.	26
<i>L. meridionalis</i>	Reptilia, Serpentes	<i>Natrix natrix</i>	Spain	<i>Crataegus monogyna</i>	40
<i>L. collaris</i>	Reptilia, Serpentes	Snake	Kenya	n.a.	41
<i>L. collurio</i>	Reptilia, Serpentes	<i>Hierophis viridiflavus</i>	Italy	<i>Prunus spinosa</i>	19
<i>L. ludovicianus</i>	Reptilia, Serpentes	<i>Nerodia rhombifera</i> , <i>N. erythrogaster</i> , <i>Regina grahami</i> , <i>Storeria dekayi</i> , <i>Thamnophis proximus</i> , <i>Diadophis punctatus</i> , <i>Coluber constrictor</i> , <i>Tropidoclonion lineatum</i>	USA	Barbed wire and thorns	38
<i>L. ludovicianus</i>	Reptilia, Serpentes	<i>Chionactis occipitalis</i>	USA	<i>Fouquieria splendens</i>	42

Table 1 – continued

<i>Lanius</i> species	Prey taxa	Prey species	Country	Support used for impaling	Source
<i>L. ludovicianus</i>	Reptilia, Serpentes	<i>Sistrurus catenatus</i>	USA	n.a.	35
<i>L. ludovicianus</i>	Reptilia, Serpentes	<i>Tantilla planiceps</i>	USA	n.a.	43
<i>L. ludovicianus</i>	Reptilia, Serpentes	<i>Heterodon nasicus</i>	USA	<i>Sapindus saponaria</i>	44
<i>L. ludovicianus</i>	Reptilia, Serpentes	<i>Thamnophis radix</i>	USA	<i>Gleditsia triacanthos</i> , <i>Maclura pomifera</i>	6
<i>L. excubitor</i> / <i>L. meridionalis</i>	Reptilia, Sauria	<i>Chalcides striatus</i> , <i>Psammotromus hispanicus</i> , <i>P. algirus</i> , <i>Timon lepidus</i> , <i>Podarcis muralis</i> , <i>P. hispanica</i> , <i>P. bocagei</i>	Spain	n.a.	26
<i>L. excubitor</i>	Reptilia, Sauria	<i>Zootoca vivipara</i>	Norway	n.a.	45
<i>L. excubitor</i>	Reptilia, Sauria	<i>Lacerta agilis</i>	Bulgaria	<i>Rosa</i> sp.	46
<i>L. meridionalis</i>	Reptilia, Sauria	<i>Gallotia atlantica</i>	Canary Islands, Spain	Palm tree	47
<i>L. meridionalis</i>	Reptilia, Sauria	<i>Chalcides simonyi</i> , <i>Gallotia atlantica</i> , <i>Tarentola angustimentalis</i>	Canary Islands, Spain	<i>Lycium intricatum</i>	27
<i>L. meridionalis</i>	Reptilia, Sauria	<i>Gallotia galloti</i> , <i>Tarentola delalandii</i>	Canary Islands, Spain	n.a.	48
<i>L. meridionalis</i>	Reptilia, Sauria	<i>Chamaeleo chamaeleon</i>	Spain	<i>Pinus halepensis</i>	49
<i>L. meridionalis</i>	Reptilia, Sauria	<i>Psammotromus algirus</i> , <i>P. hispanicus</i> , <i>Acanthodactylus erythrus</i>	Spain	n.a.	50
<i>L. meridionalis</i>	Reptilia, Sauria	<i>Trachylepis socotrana</i>	Socotra Island, Yemen	<i>Craton socotranus</i>	28
<i>L. collaris</i>	Reptilia, Sauria	Small lizards	Lesotho	n.a.	32
<i>L. collaris</i>	Reptilia, Sauria	<i>Lacerta agilis</i>	Central Europe	<i>Prunus spinosa</i> , <i>Crataegus oxyacantha</i>	33
<i>L. collaris</i>	Reptilia, Sauria	<i>Zootoca vivipara</i> , <i>Lacerta agilis</i>	Denmark	n.a.	51
<i>L. collaris</i>	Reptilia, Sauria	<i>Zootoca vivipara</i>	Germany	n.a.	14
<i>L. collaris</i>	Reptilia, Sauria	<i>Podarcis muralis</i> , <i>Lacerta bilineata</i> , <i>Lacerta</i> sp.	Italy	<i>Prunus spinosa</i>	19
<i>L. collaris</i>	Reptilia, Sauria	<i>Chalcides striatus</i> , <i>Podarcis muralis</i> , <i>Podarcis hispanica</i> , <i>Psammotromus hispanicus</i>	Poland	n.a.	17
<i>L. collaris</i>	Reptilia, Sauria	<i>Gallotia galloti</i>	Spain	n.a.	26
<i>L. collaris</i>	Reptilia, Sauria	<i>Gallotia galloti</i>	Spain	n.a.	52

Table 1 – continued

<i>Lanius</i> species	Prey taxa	Prey species	Country	Support used for impaling	Source
<i>L. collurio</i>	Reptilia, Sauria	<i>Zootoca vivipara</i> , <i>Lacerta agilis</i>	Sweden	<i>Prunus spinosa</i> , <i>Rosa canina</i> , <i>Juniperus communis</i>	15
<i>L. senator</i>	Reptilia, Sauria	<i>Podarcis hispanica</i>	Spain	n.a.	26
<i>L. senator</i>	Reptilia, Sauria	<i>Podarcis liolepis</i>	Columbretes Islands, Spain	<i>Lycium intricatum</i>	Castilla and Sánchez, personal observation
<i>L. ludovicianus</i>	Reptilia, Sauria	<i>Anolis carolinensis</i> , <i>Plestiodon inexpectatus</i> , <i>Scincella lateralis</i>	USA	n.a.	34
<i>L. ludovicianus</i>	Reptilia, Sauria	<i>Cnemidophorus sexlineatus</i> , <i>Scincella lateralis</i>	USA	Barbed wire and thorns	38
<i>L. ludovicianus</i>	Reptilia, Sauria	<i>Sceloporus belli</i>	Mexico	<i>Yucca elata</i>	53
<i>L. ludovicianus</i>	Reptilia, Sauria	<i>Uma inornata</i>	USA	n.a.	54
<i>L. ludovicianus</i>	Reptilia, Sauria	<i>Aniella pulchra</i>	USA	n.a.	55
<i>L. ludovicianus</i>	Reptilia, Sauria	<i>Dipsosaurus catalinensis</i>	Mexico	<i>Fouquieria diguetii</i>	56
<i>L. ludovicianus</i>	Reptilia, Sauria	<i>Phrynosoma modestum</i>	USA	<i>Yucca torreyi</i>	57
<i>L. ludovicianus</i>	Reptilia, Sauria	<i>Phrynosoma braconneri</i>	Mexico	<i>Agave salmiana</i>	58
<i>L. ludovicianus</i>	Reptilia, Sauria	<i>Phrynosoma mcallii</i>	USA	Barbed wire; <i>Prosopis glandulosa</i>	59
<i>L. ludovicianus</i>	Reptilia, Sauria	<i>Phrynosoma cornutum</i>	USA	Barbed wire	38,60
<i>L. sp.</i>	Reptilia, Sauria	<i>Mesalina adramitana</i>	Qatar	<i>Phoenix dactylifera</i>	Present study

favoring longer horns. The intensity of bird predation was shown to impact reptile communities by inducing changes in lizard parasites.²¹

OBSERVATION

During 2012–2013 a preliminary field inventory of lizards was carried out in Qatar, resulting in a list of 21 species.²² On April 12, 2013 at 11:50 am we observed a still alive, adult male *Mesalina adramitana* freshly impaled on a palm tree (*Phoenix dactylifera*), at approximately 150 cm above ground, near Al Jassasiya (N25.9627, E51.3914) (Figure 1b). The palm tree had a height of approximately 3.5 m and was the only tree in a radius of several hundred meters (Figure 1a). Several passeriform birds, including an unidentified species of *Lanius* were seen in nearby shrubs. Whilst we did not directly observe the predation event, the presence of shrikes in the area and the method of impalement indicate shrikes as the predator. In this note we add *Mesalina adramitana* to the reptile species list preyed on by shrikes that to our knowledge was not yet reported. Other species present in Qatar have been photographed as shrike prey in other countries, such as *Acanthodactylus schmidti* in Dubai²³ and *Cyrtopodion scabrum* in Kuwait.²⁴ Although usually thorny shrubs or trees are used as ladders by shrikes, in xeric areas in Algeria shrikes have been reported to use palms as food storage,²⁵ similar to this observation in Qatar. This is the first report, to our knowledge, of the predation of shrikes on lizards in Qatar. Predation of shrikes on amphibians and reptiles were reported generally in North America and Europe. Reptiles are frequently reported as shrike prey in arid environments, including a variety of lizards, snakes and even occasionally tortoises^{12,19,26}. Clark⁷ gives a list of reptiles and amphibians reported in the literature as prey of the Loggerhead Shrike (*L. ludovicianus*), but did not provide details regarding the support used for impaling. We compiled a more detailed list of amphibian and reptile prey species of shrikes, not limited to a country or species (Table 1).

DISCUSSION

During our surveys, the impaled specimen was our first sighting of *M. adramitana* in Qatar, and this observation compelled continued searching for the species in that area. In a similar way, rare and elusive skinks were identified or studied: *Chalcides simonyi* was detected from scattered body parts in a kestrel pellet and impaled specimens by shrikes in the Canary Islands.²⁷ During several reptile samplings in Socotra Island, *Trachylepis socotrana* was detected, but only impaled as shrike prey.²⁸ Thus searching for animals captured and impaled by shrikes can prove useful especially when dealing with rare and elusive species, complementing commonly used methods for species inventory in biodiversity studies. In a similar way rodent inventories are often improved by analyzing regurgitated pellets or scats of predators such as the barn owl (*Tyto alba*)^{29,30} or genet (*Genetta genetta*).³⁰

CONCLUSION

Additional biodiversity inventories will allow the estimation of the importance of shrike predation on vulnerable lizard communities in Qatar. These inventories are necessary to complete preliminary distribution maps of lizards in Qatar,²² and should consider detailed observations of vegetation and thorns, as well as examination of excrement and pellets from avian and mammal predators.

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