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## Ticks of the Tristan da Cunha Archipelago

(Acarina: Ixodidae: Argasidae)

With 1 map, 2 plates and 2 tables

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### Summary

All the tick species reported in the literature from the Tristan da Cunha archipelago have been listed and discussed, including a new locality and likely host record for *Ixodes (Multidentatus) zumpti* ARTHUR, 1960, based on material recently collected. A total of 10 tick species, belonging to three genera from two families, have been listed together with their hosts: five bird species and a probable hoofed mammal. A summary of the tick collections made at the archipelago together with their repositories is provided, as well as a detailed list of the ticks recorded from the four main islands.

### Zusammenfassung

Die vorliegende Arbeit fasst alle bisher in der Literatur erwähnten Funde von Zecken-Arten der Tristan da Cunha Inseln zusammen. *Ixodes (Multidentatus) zumpti* ARTHUR, 1960 und dessen Wirt können aufgrund aktueller Untersuchungen erstmals für den Archipel gemeldet werden. Eine aktuelle Liste von 10 Zecken-Arten aus drei Gattungen und zwei Familien und deren Wirte, nämlich fünf Vogel-Arten und vermutlich ein Huftier, ist beigelegt. Weiterhin sind eine summarische Liste der Funde vom Archipel, detaillierte Listen von den Hauptinseln sowie der Verbleib des Materials aufgeführt.

### Key words

Ticks; Acarina; Ixodidae; Argasidae; ectoparasites; Tristan da Cunha; Nightingale; Inaccessible; Gough; Islands; South Atlantic Ocean; seabirds.

### Introduction

Lying in the central South Atlantic, the Tristan da Cunha archipelago consists of four main islands and a few islets. Three of the islands, Tristan da Cunha (herein after referred to as Tristan), Inaccessible and Nightingale (with its associated Middle and Stoltenhoff islets), lie within 40 km of each other around 37°S, 12°W, while the fourth, Gough Island, is positioned at 40°18' S, 09°56' W, some 350-426 km further to the south-south-east of Tristan. The closest continent is Africa, South Africa being approximately 2,800 km distant, and the nearest point of South America lies 3,200 km to the west (Fig. 1).

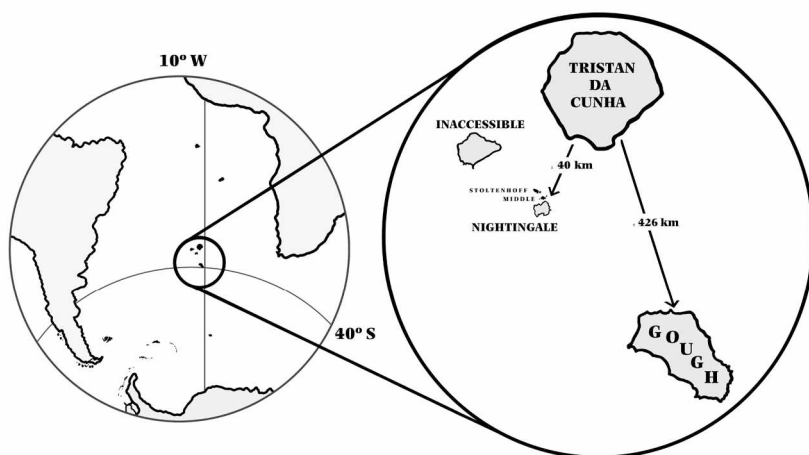


Fig. 1: The islands of the Tristan da Cunha archipelago and their position in the Atlantic Ocean. Map drawn by Christine Hänel.

The largest Island of the group is Tristan, comprising an area close to 100 km<sup>2</sup> with a circumference of approximately 40 km measured around its perimeter and a central peak that rises to about 2060 m. It is the only island within the archipelago that has a permanent human settlement, the population totalling some 275 people, and has the status of being 'the most remote inhabited island on Earth'. The second largest of the islands is Gough with a surface area of 65 km<sup>2</sup>, followed by Inaccessible (area 14 km<sup>2</sup>) and Nightingale (approximately 3 km<sup>2</sup>). Two of the islands, namely Gough and Inaccessible, are World Heritage Sites. Accordingly Gough, as a Wildlife Reserve, and Inaccessible, as a Nature Reserve, are protected areas to which access is restricted. At Gough access is limited primarily to the personnel servicing the South African weather station on the island and the occasional group of scientists permitted to conduct research projects there (HÄNEL et al, 2005). Inaccessible has no permanent human-made structures and visits are regulated in accordance with the Inaccessible Island Management Plan (RYAN & GLASS, 2001).

### Faunal components

The most striking features of the islands are the birds that make use of them. The archipelago supports some 28 breeding species, 22 of which are seabirds and 6 endemic landbirds. Additional records include at least 34 vagrant species and at least two types of poultry (chickens and ducks). The poultry are introductions restricted to Tristan da Cunha (RYAN & GLASS, 2001; HÄNEL et al., 2005; GLASS & SANDERS, 2006).

The mammals breeding on the islands total some 13 species. These are represented by two native marine species and at least 11 introduced terrestrial species. The former being the fur- and elephant seals, and the latter comprise the humans occupying the permanent settlement on Tristan, various livestock (cattle, sheep, pigs, donkeys and horses), domestic animals (dogs and cats) and vermin (mice and two types of rats), all of which are restricted to Tristan da Cunha, with the exception of mice that have persisted on Gough Island (HÄNEL & PALMA, (2007), provide a full list of all species).

### Ticks and their hosts

Together, the 64 birds and 13 mammals of the Tristan archipelago represent some 77 potential hosts for ticks (Order Acarina). Despite this relatively large number and the fact that livestock and domestic animals were introduced to the islands as early as 1790 (including Gough until the



Fig. 2: Photographs of the seabird tick *Ixodes (Multidentatus) zumpti* female. (A) Dorsal view. (B) Ventral view. Photographs taken by John Putterill, Agricultural Research Council, Onderstepoort Veterinary Institute, Pretoria (ARC-OVI).

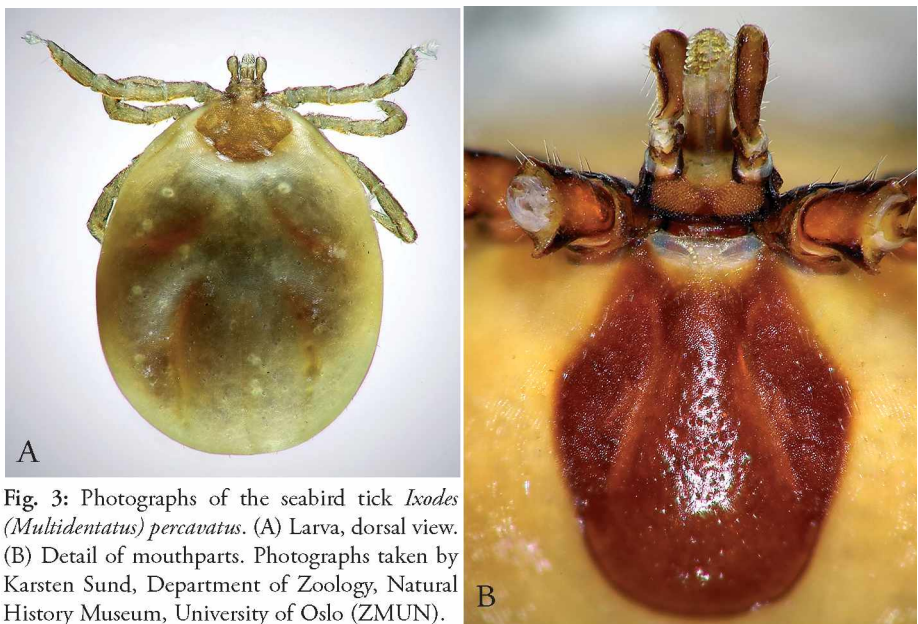


Fig. 3: Photographs of the seabird tick *Ixodes (Multidentatus) percavatus*. (A) Larva, dorsal view. (B) Detail of mouthparts. Photographs taken by Karsten Sund, Department of Zoology, Natural History Museum, University of Oslo (ZMUN).

1970's, and Tristan da Cunha, where they persist to the present day), only five hosts have to date been recorded, none of which are mammals (see Tab. 2). The occurrence of the Blue tick *Rhipicephalus (Boophilus) decoloratus* (KOCH, 1844) has been documented for Tristan da Cunha, and although its source on the Island is not known, is a species normally associated with bovine hosts.

### The status quo

Knowledge about the Acarina of the archipelago is sparse and fragmented, with published records concerning the ticks from the islands scattered in journals and books dating from 1905 to 1971 (see list of references). Specimens in collections, although only few, date back to Oct. 1898 (see ARC-OVI under repositories). To fill some of the gaps, a brief invertebrate project was conducted during 2005 that aimed at empowering the people of Tristan da Cunha with information and collecting techniques, whereby a collection was made at Tristan and Nightingale islands that included a small number of ticks (HÄNEL, 2005).

## Materials and methods

To present an up-to-date synthesis of the status quo relevant to the ticks and their hosts as found at the islands of the Tristan archipelago, a search was made of all available information. This covered literature in the published domain, unpublished records, locating material in various repositories (but not examining any of it) and determining the findings of the 2005 collection.

The tick material collected during 2005 comprised a total of nine specimens; seven of which were found at Tristan and two at Nightingale. The ticks from Nightingale as well as three found on Tristan's north-western plateaux were obtained by means of hand searches from the peri-ocular region of adult Atlantic yellow-nosed mollymawk *Thalassarche chlororhynchos* (GMELIN, 1789). The remaining four tick specimens were obtained by gathering soil samples from a penguin rookery populated by moulting Northern rockhoppers *Eudyptes chrysocome moseleyi* MATHEWS & IREDALE, 1921, and extracting the specimens using Berlese/Tulgren funnels (SOUTHWOOD et al, 2000). All ticks were preserved in 70 % Ethanol and identified by H. H., using the description in ARTHUR (1965), with verification by Arthur Spickett. Four of the nine specimens were deposited in the Onderstepoort Veterinary Institute collection, two in the University of Oslo collection and three in the Agriculture and Natural Resources Department, Tristan da Cunha (see details under repositories below).

## Results

### Material collected in 2005

The three tick specimens from Tristan's north-western plateaux were located in a *Blechnum palmiforme* fern dominated habitat below Dailies Hill at 37°108'44" S; 12°326'53" W, approximately 2270ft above sea level, on the 15<sup>th</sup> February 2005. All were engorged nymphs, deemed probable *Ixodes (Multidentatus) zumpti* ARTHUR, 1960. The four ticks collected from the penguin rookery were located at Sandy Point in a boulder gulch shaded by pine trees, at 37°122'04" S; 12°223'60" W, some 120ft a.s.l., on the 21<sup>st</sup> February 2005. All were un-engorged specimens, comprising one female, two nymphs, and one larva, identified as *Ixodes (Multidentatus) zumpti*

ARTHUR, 1960 (the nymphs and larva are probable I.D's). The two tick specimens from Nightingale were collected on the 30<sup>th</sup> March 2005 from an adult Atlantic yellow-nosed mollymawk *Thalassarche chlororhynchos* (GMELIN, 1789), located at one of the Ponds furthest away from the access path, in a high lying wetland area some 200ft a.s.l., at 37°25'616" S; 12°29'302" W. Both were engorged *Ixodes* nymphs. The mouthparts of the one were broken off and so no further identification could be made with any certainty, while the other was, by comparison with the female *I. (M.). zumpti* from Tristan, deemed to be the same species.

### History of collections

The history of tick collections made on islands of the Tristan archipelago is summarised in Tab. 1.

Tab. 1: Tick collections made on islands of the Tristan archipelago. Key: TdC=Tristan da Cunha; Ngl=Nightingale; Gog= Gough; Inc= Inaccessible.

Date	Islands				Collector	Project / Role
	TdC	Ngl	Gog	Inc		
1898 Oct	√				TOOKE, W.H.	Presumed to be the same Hammond Tooke who surveyed Islands of the Tristan archipelago for Guano (HÄNEL et al, 2005, p. 31).
Prior 1905		√			(No collector cited)	(NEUMANN 1905, p. 200-201).
1937 - 1938	√	√		√	HAGEN, Yngvar	Terrestrial zoologist of the <i>Norwegian Scientific Expedition to Tristan da Cunha in 1937-38</i>
1949 - 1950		√			ROWAN, M.K.	
1952	√				ELLIOTT, Hugh Francis Ivo	Administrative Officer of Tristan da Cunha. Assumed duty on 31 January 1950.
1955 - 1956			√		HOLDGATE, Martin	Entomologist of the <i>Gough Island Scientific Survey</i> [GISS].
1962	√				BAIRD, D.E.	Royal Society Expedition to Tristan da Cunha
1999 - 2000			√		HÄNEL, Christine (& others ?)	<i>Gough Island Terrestrial Invertebrate Survey</i> [GITIS]
2005	√	√			HÄNEL, Christine	Entomologist of the <i>Tristan da Cunha Invertebrate Project</i> , a part of the Royal Society for the Protection of Birds [RSPB] larger program "Empowering the People of Tristan da Cunha to Implement the CDB" (RSPB, 2004-2005).

Of the collections made, none were full scale or dedicated tick surveys and all were of an opportunistic type. Most took place at Tristan da Cunha and Nightingale, but two were also conducted at Gough and one at Inaccessible Island. These have revealed that Tristan hosts six tick species, Nightingale at least seven and Inaccessible two (see Table 2). Gough Island is also known to host ticks thought to be of different species. This assertion is based on Holdgate (1965), and C.H. who collected specimens for GITIS during 1999-2000 (CHOWN et al., 2000 & JONES, 2001). However, no information about the Gough specimens seems yet to have been published and none of the material collected for GITIS and the GISS could be traced in any of the repositories listed below.



### Total tick records

To date the tick records from all the islands of the Tristan archipelago amount to a total of ten species including one, which has been identified to generic level only, representing three tick genera from two families (see Tab. 2 and Appendix). Two records identified to genus level are cited as sp. indet., but no further information could be traced with respect to the "various unidentified specimens from Gough Island" (HOLDGATE, 1965). Not all records reveal the source of the ticks, but five native bird species breeding at the island have been identified as hosts. Others bird species are also suspected to be involved, as is at least one bovine mammal. Evidence of the former is given in two cases by the mention of the ticks being from and in the vicinity of penguin nests, which point to the Northern rockhopper, as it is the only penguin species breeding at the archipelago. The finding on the 21<sup>st</sup> Feb. 2005 of four ticks from soil out of a Northern rockhopper penguin rookery, further suggests that these penguins serve as hosts. In the case of *I. (M.) zumpti*, the Tristan 2005 finds represent a new locality record for the tick species, previously known only from Nightingale (see Tab. 2 and Appendix 1).

### Repositories

The following institutions (with their acronyms and holdings) are known to house or have been recipients of tick material collected from the islands of Tristan archipelago:

ANR-TC - **Agriculture and Natural Resources Department, Tristan da Cunha.**

*I. (M.) zumpti* [presumed]: 2N engorged, TdC; *Ixodes* sp., 1N engorged, N'gale Isl., Hosts: *T. chlororhynchos*; Leg.: C. Hänel, 21.ii.2005, RSPB proj.

ARC-OVI - **Agricultural Research Council, Onderstepoort Veterinary Institute, Pretoria, S.A.**

OP2646 *Carios capensis*: 1M, 2F, 1N, TdC penguin nest, coll.: W.H. Tooke, Oct. 1898, ex Bedford Collection; OP3402 *I. (M.) zumpti*: 1F, 2N, 1L un-engorged, TdC, from soil in rookery of *E. c. moseleyi*; Leg.: C. Hänel, 21.ii.2005, RSPB proj.

MCZ - **Museum of Comparative Zoology, Harvard College, Mass., U.S.A.**

*I. (M.) percavatus*: 9N, N'gale Isl; Host: *T. chlororhynchos*; Leg.: Y. Hagen, 1937-38 Norw. Sci. Exp. to TdC.

NICD - **National Institute for Communicable Diseases, Johannesburg, S.A.**

(Formerly: South African Institute for Medical Research).

*I. (M.) diomedae*: 1F=Holotype, N'gale Isl., Host: *T. chlororhynchos*, 4.iv.1950.

The following material is cited in the literature as deposited in the SAIMR, but could not be traced (C.H. in lit with curator Mrs. Segerman, c/o M. Coetzee).

*I. (M.) percavatus*: Electotype, N'gale Isl., Host: *T. chlororhynchos*, 9.iv.1950 (Arthur, 1960).

*Ixodes* sp.: 7N, N'gale Isl., Host: *T. chlororhynchos*, coll.: M.K. Rowan (Arthur, 1965).

NHML - **Natural History Museum, London, U.K.**

(Formerly: British Museum (Natural History)).

No holdings of TdC archipelago specimens (C.H. in lit with J. Beccaloni, curator of Acarina).

The following material is cited in the literature as deposited in the NHML, but could not be traced:

*I. (M.) percavatus*: 4F, dried mutilated = Types, from N'gale Isl., described by L.G. Neumann (1905); re-described by Nuttall (1911) and referred to by Arthur (1953 & 1965) and Anastos (1954).

"Various undetermined species from Gough Island", coll. M. Holdgate, 1955-56 (Holdgate in lit. with C.H. advised that he deposited his entire collection in the NHML).

- USNT - U.S. National Tick Collection (Smithsonian Institution), Georgia, U.S.A.  
(Formerly Rocky Mountain Laboratory - RML & other collections).  
*I. (M.) percavatus*: 4?F; 7?N; TdC, Leg.: H.F. Elliott, 1952, ID: H. Hoogstraal.
- ZMUN - Department of Zoology, Natural History Museum, University of Oslo, Norway.  
*I. (M.) percavatus*: 2L, TdC, off *T. chlororhynchos*; 1L; 1N + 16N; 1F engorged, N'gale Isl., off Juv. *T. chlororhynchos*; 1L, Inac. Isl., Host: *Nesocichla*; Leg.: Yngvar Hagen, 1937-38 Norw. Sci. Exp. to TdC; det. G. Anastos. *I. (M.) zumpti* [presumed]: 2N engorged, TdC & N'gale Isl's., Host: *T. chlororhynchos*; Leg.: C. Hänel, 21.ii.2005, RSPB proj.
- ? Unknown repository or where-about.  
*I. (M.) zumpti*: 1F[Paratype], N'gale Isl., Host: *T. chlororhynchos*, Leg.: M.K. Rowan, 5.iv.1950 (Cited in Arthur, 1965-but without stating from or to which repository the specimen was from or deposited).

## Discussion and Conclusions

The non-insecta invertebrates known to occur at the Tristan archipelago amount to some 180 species, of which half belong to the arachnida. Yet ticks make up merely 5.5 % despite the numerous potential hosts represented. The apparent paucity of tick species may be a result of various factors. An insufficiency in collecting effort is regarded as one of the major contributing aspects. This despite the fact that some concerted attempts have been made to survey the islands, including Gough during 1955-1956 and 1999-2001 (JONES et al., 2003). Nevertheless, Gough, the most intensively studied of the islands, remains the only one amongst the group for which the species of ticks are still not known. Several reasons can be advanced for this, of which the "archiving effect" may well be a major one. In the current efforts to trace tick material collected, it became apparent that much remains unidentified and undocumented, and in some cases, 'lost in the system'.

With respect to the ticks parasitizing marine birds the 'taxonomic tangle' referred to by THEILER, (1971), appears still to be far from unravelled. The poor state of some of the only representative specimens and the paucity of collection material available, are no doubt factors that contribute to this problem and to the difficulties in solving it. The fact that at least two species *Ixodes (Multidentatus) diomedae* ARTHUR, 1958 and *I. (M.) zumpti*, and arguably a third, namely *Ixodes (Multidentatus) percavatus* NEUMANN, 1905, are hitherto only known from the Tristan archipelago, serve to emphasise the extent of these problems.

At this premature stage of the tick investigations, both at the Tristan archipelago and on seabird ticks world wide, the status of the ticks, whether endemic, or native, cannot be rated, as the more complex criteria for such determinations are inconclusive. It is however known that the soft tick *Carios capensis* (NEUMANN, 1901) is widely distributed in many parts of the world, parasitizing nesting seabirds, especially the southern hemisphere (DUFFY 1991; HEATH 1987).

The single record of a Blue tick *Rhipicephalus (Boophilus) decoloratus* (KOCH, 1844) from Tristan could point to a probable introduction that failed to establish because of unfavourable climatic conditions. Field trials have shown that *R. (B.) decoloratus* larvae fail to hatch below 10°C (SPICKETT & HEYNE, 1990). However, the establishment or re-introduction of the tick at Tristan cannot be ruled out, as agricultural products, including live stock, continue to be imported. The fact that no further evidence of its presence has come to light, could well be due to the lack of collecting effort.

Tab. 2: Ticks species and their associated hosts from the Tristan da Cunha archipelago.

Order ACARINA – Ticks			ISLANDS				HOSTS
FAMILY	GENUS	SPECIES	Tri	Nig	Ina	Gou	
Argasidae Soft ticks or tampanis	Argas	<i>Argas</i> sp.	√				Not specified
	Carios	<i>Carios capensis</i> Seabird soft tick	√				Penguin nests - (Northern rockhopper <i>Eudyptes chrysocome moseleyi</i> ?)
Ixodidae Hard ticks	Ixodes Russet ticks	<i>Ixodes (Ceratixodes) uriae</i>		√			? Atlantic yellow-nosed mollymawk, <i>Thalassarche chlororhynchos</i>
		<i>Ixodes (Multidentatus) auritulus</i>		√			Atlantic yellow-nosed mollymawk, <i>Thalassarche chlororhynchos</i>
			√		√		Not specified
		<i>Ixodes (Multidentatus) diomedae</i>		√			Atlantic yellow-nosed mollymawk, <i>Thalassarche chlororhynchos</i>
		<i>Ixodes (Multidentatus) kerguelensis</i>		√			Atlantic yellow-nosed mollymawk, <i>Thalassarche chlororhynchos</i>
							Great shearwater, <i>Puffinus gravis</i>
							Sooty albatross, <i>Phoebetria fusca</i>
		<i>Ixodes (Multidentatus) percavatus</i>			√		Tristan thrush, <i>Nesocichla eremita</i>
			√				Not specified
			√				Atlantic yellow-nosed mollymawk, <i>Thalassarche chlororhynchos</i>
							In vicinity of ? Northern rockhopper penguin, <i>Eudyptes chrysocome moseleyi</i>
		<i>Ixodes (Multidentatus) rothschildi</i>		√			Atlantic yellow-nosed mollymawk, <i>Thalassarche chlororhynchos</i>
		<i>Ixodes (Multidentatus) zumpti</i> # = New locality record	√ #				Rookery of Northern rockhopper penguin, <i>Eudyptes chrysocome moseleyi</i>
				√			Atlantic yellow-nosed mollymawk, <i>Thalassarche chlororhynchos</i> Sooty albatross, <i>Phoebetria fusca</i>
		<i>Ixodes</i> sp. (percavatus group) nymphs		√			Atlantic yellow-nosed mollymawk, <i>Thalassarche chlororhynchos</i>
		<i>Ixodes</i> sp. indet.		√			Not specified
<i>Rhipicephalus (Boophilus) decoloratus</i> Blue tick	√				Not specified (Usually associated with livestock such as <u>cattle</u> . May also use <u>sheep</u> & <u>donkeys</u> )		
"Various undetermined species from Gough Island"						√	Not specified (HOLDGATE, 1965)
TOTALS: 2	3	10 + 2 spp. indet & "various undetermined spp."	6	7+ 2 sp. indet	2	1 + ?	



The 2005 finding of *I. (M.) zumpti* at Tristan da Cunha is not without some interest, given that tick collections were historically more prolific at that Island, yet *I. (M.) zumpti* had only been found at Nightingale. In view of Tristan also being the island within the group that has been subject to the most impact by humans, the find is indeed surprising.

Given the small sample size and opportunistic collecting methods employed in the gathering of ticks during the 2005 project, the discoveries made from the results have shown that there is a high probability of more to come. They also emphasize the need for an in-depth study if more meaningful results are to be obtained.

The Acarina are amongst the archipelago's most neglected taxa. Indeed, the status quo remains one where by information is based on a history of 'haphazard contributions' which, as THEILER (1971) concluded "... give no final answer as to what species or sub-species occurs where, much less give an informed guess as to its ecological requirements and hence potential spread, if introduced into new habitats".

In recent years visits to the archipelago's islands have increased substantially, as have imports to Tristan da Cunha. This extended traffic has also multiplied the chances of species introductions (GASTON et al., 2003; HÄNEL & HAENNI, 2007). The effect of this is already being felt, particularly at Tristan, where some taxa have reached pest status (RSPB 2004-2005; GLASS & SANDERS, 2006). Given the pristine nature of the islands, and the dependence by Tristan da Cunha on its agriculture, prevention of alien imports is paramount, especially the likes of tick species that are potential vectors of diseases. This goes hand in hand with the need for increased knowledge concerning the tick fauna at the islands and the 'undesirables' that need to be prevented from establishing on them.

### Acknowledgements

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## APPENDIX 1.

### Ticks recorded from the Tristan da Cunha Archipelago

This list includes all the tick families, genera and species as recorded in connection with the Tristan archipelagos four islands of Tristan da Cunha, Inaccessible, Nightingale and Gough.

The phylogeny has a confusing history and is still in dispute, particularly with respect to the sub genera. We therefore caution that the classification as we present it, may not necessarily be unanimously in use and could yet again change. Our nomenclature is in accordance with BARKER & MURRELL (2004), CLIFFORD et al. (1973) and HORAK et al. (2004).

#### Order Acarina

##### Suborder Ixodides LEACH, 1815

##### Superfamily Ixodoidea N. BANKS, 1894

##### Family Argasidae C. L. KOCH, 1844

##### Sub family Argasinae

##### Genus *Argas* LATREILLE, 1795

#### *Argas* sp.

*Argas* sp.; BAIRD, 1965: 427 – Tristan da Cunha.

*Argas* sp.; HOLDGATE, 1965: 397 – Tristan da Cunha.

Host(s): Not specified.

##### Sub family Ornithodorinae

##### Genus *Carios* LATREILLE, 1796

#### *Carios capensis* (NEUMANN, 1901)

*Ornithodoros capensis*; THEILER, 1962: 13 – Tristan da Cunha islands.

*Ornithodoros capensis*; THEILER, 1971: 328 – Tristan da Cunha group.

*Ornithodoros (Alecterobius) capensis*; THEILER, 1971: 330 – Tristan da Cunha group.

*Carios capensis* - Tristan da Cunha (ARC-OVI).

Host: Penguin nests - (? Northern rockhopper *Eudyptes chrysocome moseleyi*).

##### Family Ixodidae MURRAY, 1877

##### Sub family Ixodinae VITZTHUM, 1941

##### Genus *Ixodes* LATREILLE 1795

##### Subgenus *Ceratixodes* NEUMANN, 1902

#### *Ixodes (Ceratixodes) uriae* WHITE, 1852

*Ceratixodes uriae*; ZUMPT, 1952: 13 – Nightingale Island.

*Ceratixodes uriae*; THEILER, 1962: 44 – Nightingale Island.

*Ixodes uriae*; ARTHUR, 1965: 328 – Nightingale Island.

Host(s): *Thalassarche chlororhynchos* ?

## Subgenus *Multidentatus* CLIFFORD et. al., 1973

### *Ixodes (Multidentatus) auritulus* NEUMANN, 1904

*Ixodes auritulus*; ROWAN, 1951: 152 – [Nightingale Island].

*Ixodes auritulus*; ZUMPT, 1952: 16 – Nightingale Island.

*Ixodes auritulus*; ARTHUR, 1953: 225 – Nightingale Island.

*Ixodes auritulus*; THEILER, 1959: 354; 367 – Nightingale Island.

*Ixodes auritulus*; THEILER, 1962: 27 – Tristan da Cunha, Nightingale Island, Inaccessible Islands.

Hosts: *Thalassarche chlororhynchos*.

### *Ixodes (Multidentatus) diomedae* ARTHUR, 1958

*Ixodes diomedae*; Arthur, 1958: 128 – Nightingale Island.

*Ixodes diomedae*; Theiler, 1962: 30 – Nightingale Island.

*Ixodes diomedae*; Arthur, 1965: 314 – [Nightingale Island ?], Tristan da Cunha.

*Ixodes diomedae*; Theiler, 1971: 328 – Tristan da Cunha group.

Host: *Thalassarche chlororhynchos*.

### *Ixodes (Multidentatus) kerguelensis* ANDRÉ & COLAS-BELCOUR, 1942.

*Ixodes kerguelensis*; THEILER, 1971: 328 – Tristan da Cunha group. (Nightingale)

Hosts: *Puffinus gravis*; *Phoebetria fusca*; *Thalassarche chlororhynchos*.

### *Ixodes (Multidentatus) percavatus* NEUMANN, 1905

*Ixodes percavatus*; NEUMANN, 1905: 201 - Nightingale Island.

*Ixodes (Ixodes) percavatus*; NEUMANN, 1911: 21 - Nightingale Island.

*Ixodes percavatus*; NUTTALL et. al., 1911: 220 – Nightingale Island.

*Ixodes percavatus*; ROWAN, 1951: 152 – [Nightingale Island].

*Ixodes percavatus*; ANASTOS, 1954: 1 – Tristan da Cunha; Nightingale & Inaccessible Islands.

*Ixodes percavatus*; ARTHUR, 1960: 200; 212 – Nightingale Island.

*Ixodes percavatus*; ARTHUR, 1965: 316 – Nightingale Island.

*Ixodes percavatus*; HOLDGATE, 1965: 397 – Tristan da Cunha, Nightingale & Inaccessible Islands.

*Ixodes percavatus*; THEILER, 1971: 328 – Tristan da Cunha group.

*Ixodes pterodromae*; THEILER, 1971: 330 – Nightingale Island.

Hosts: *Thalassarche chlororhynchos*; *Nesocichla eremita*, (*Eudyptes chrysocome moseleyi*?).

### *Ixodes (Multidentatus) rothschildi* NUTTALL & WARBURTON, 1911

*Ixodes rothschildi*; ROWAN, 1951: 152 – [Nightingale Island].

*Ixodes rothschildi*; ZUMPT, 1952: 17 – Nightingale Island.

*Ixodes rothschildi*; THEILER, 1959: 355 – Nightingale Island.

Host: *Thalassarche chlororhynchos*.



***Ixodes (Multidentatus) zumpti* ARTHUR, 1960**

*Ixodes zumpti*; ARTHUR, 1960: 215 – Nightingale Island.

*Ixodes zumpti*; THEILER, 1962: 44 – Nightingale Island.

*Ixodes zumpti*; ARTHUR, 1965: 325 – Nightingale Island.

*Ixodes zumpti* – TRISTAN DA CUNHA & NIGHTINGALE ISLANDS (ARC-OVI; ZMUN; NRTC). **New locality record.**

Hosts: *Puffinus gravis*; *Thalassarche chlororhynchos*; *Phoebastria fusca*; Rookery of *Eudiptes chrysocome moseleyi*. **New host site record.**

***Ixodes* sp.**

*Ixodes* sp. nymphs (*percautus* group); ARTHUR, 1965: 337 – Nightingale Island.

Host: *Thalassarche chlororhynchos*.

***Ixodes* sp.**

*Ixodes* sp. indet. HOLDGATE, 1965: 397 – Nightingale Island.

Host(s): Not specified.

Sub family Rhipicephalinae VITZTHUM, 1941.

Genus *Rhipicephalus* KOCH, 1844

Subgenus *Boophilus* CURTIS 1891

***Rhipicephalus (Boophilus) decoloratus* (KOCH, 1844)**

*Boophilus decoloratus*; HOLDGATE, 1965: 397 – Tristan da Cunha.

Host(s): Not specified.

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