

**Update on Boot and Clothing Decontamination Guidelines and
the Introduction and Detection of Diseases in
Antarctic Wildlife: IAATO's Perspective**

**Submitted by the International Association of Antarctica Tour
Operators (IAATO)**

Acknowledging concerns towards the increase in activity in tourism, science, logistics, and the build-up toward the International Polar Year, as well as concerns raised by Australia (ATCM XXVIII WP 28 CEP 4 (d)) and IUCN (XXVXIII IP 63 CEP 4(d)), IAATO offers its boot and clothing decontamination guidelines for discussion and possible adoption, in whole or in part, by other visitors and activities in Antarctica. Details of IAATO's Boot and Clothing Decontamination Guidelines are presented in Appendix A, and Introduction and Detection of Diseases in Antarctic Wildlife is Appendix B.

In the event of Parties authorizing or permitting visits to Antarctica for operators who are not covered under the IAATO umbrella, IAATO recommends that some sort of guidelines on these subjects be made available for non-member vessels and for national programs landing tourists and crew from their ships or by aircraft.

The guidelines listed here have been presented to SATCM XII, ATCM XXIV, XXV, XXVII and as an appendix to IAATO's annual report, but have not been discussed in depth at any of the above mentioned meetings. Further information has recently become available about an acceptable disinfectant for use in decontamination of boots and clothing. Procedures related to activities in the interior are also suggested here.

Implementation

In 2000 IAATO formalized the guidelines found in Appendix A (Boot and Clothing Decontamination) and Appendix B (Guidelines and Introduction and Detection of Diseases in Antarctic Wildlife: IAATO's Perspective). They are included in IAATO's mandatory operational procedures for all members.

The spread of non-native biota and disease to inland sites is less likely because few life forms can withstand the harsh conditions. Nevertheless, Adventure Network International/Antarctic Logistics and Expeditions (ANI/ALE) employs several procedures to minimise likelihood of the introduction of non-native biota and diseases. All passengers are advised to decontaminate clothing before departing Punta Arenas. Large items of equipment brought into Antarctica by ANI/ALE or by

expeditions are checked and, if necessary, steam-cleaned in Punta Arenas prior to departure.

Use of Chemical Disinfectant

In addition, one of IAATO's active shipboard and emergency room physicians, Dr. Chris Curry (Australia), not only played a major role in writing these guidelines but he also pioneered a three- year research study to investigate the "the feasibility and efficacy of chemical disinfection of the microbial contamination on visitors' boots." The results of this study recommend that "consideration should be given to including a disinfectant such as Virkon when cleaning the boots of visitors to wildlife sites in the Antarctic to reduce the risk of translocation of microbial pathogens. (See introduction and conclusions to this paper as Appendix C.) The research proposal that led to these results was also tabled in IAATO's *Report Of The International Association Of Antarctica Tour Operators (IAATO) ATCM XXVIP 74*. The published version of the results is noted below.

Curry, C.H., J.S. McCarthy, H.M. Darragh, R.A. Wake, S.E. Churchill, A.M. Robins, and R.J. Lowen, 2005, Identification of an agent suitable for disinfecting boots of visitors to the Antarctic. *Polar Record*, 216 (41):39-45.

Conclusion

IAATO has taken a pro-active approach toward this potential problem in Antarctica by developing its own guidelines and encouraging the use of an acceptable disinfectant when and where appropriate. These guidelines can be used not only for IAATO's member companies but also for anyone visiting Antarctica.

Appendices

- Appendix A: Boot and Clothing Decontamination: IAATO's Recommended Guidelines
- Appendix B: Introduction and Detection of Diseases in Antarctic Wildlife: IAATO's Perspective
- Appendix C: Excerpts from "*Identification Of An Agent Suitable For Disinfecting Boots Of Visitors To The Antarctic.*"

Appendix A

Boot and Clothing Decontamination: IAATO's Recommended Guidelines

Introduction

While there is at present no conclusive evidence that tourists have introduced or transmitted diseases within Antarctica, there is indirect and circumstantial evidence that raises concern. There is the potential for visitors to be vectors of disease, both into and within the Antarctic ecosystem.

To minimize this potential introduction IAATO recommends decontamination practices similar to those of the quarantine authorities of most countries who protect themselves from the introduction of external diseases.

Recommendations

1. *In pre-voyage information:*

- 1.1 Passengers are advised that Antarctica is an isolated continent and as far as we know is free of introduced diseases. We must ensure it remains so.
- 1.2 Passengers are advised that all boots and clothing must be clean before joining the ship. Those who go trekking, tramping, backpacking, farm visiting prior to the voyage must clean their boots and clothing thoroughly to remove all material from them. Velcro fasteners and tripod feet can also collect mud and seeds and should be checked regularly, as should pockets (for seeds), backpacks and anything else that has come into contact with the ground or vegetation.

2. *Pre-landing briefing:*

- 2.1 Passengers are reminded that they must have clean boots and clothing to go ashore. Facilities will be available on deck for those who need them (the boot washing station).

3. *Landings:*

- 3.1 As far as possible, avoid walking in concentrations of organic material such as guano, seal placenta, seal faeces, in order to avoid moving this material around the landing site.
- 3.2 A simple brush scrubber at the landing site helps to clean boots before entering the Zodiac or landing craft. The device at the landing site is simply a three-quarter-inch-thick plywood sheet about 2-3 feet square with a couple of stiff-bristle scrub brushes attached, placed so that boots can be placed between them and vigorous brushing cleans the sides of the boot, while a brush on the bottom

cleans the sole. The scrubbers are then thoroughly rinsed at the end of the landing period, and put into the Zodiacs or landing craft for return to the ship.

- 3.3 Before boarding the Zodiac, small landing craft or helicopter, wash as much material off boots and clothing as possible before boarding the Zodiac or small landing craft. Ensure that whatever touched the ground ashore (backpacks in particular), boot cuffs, exposed velcro be inspected, brushed off, etc., before leaving the beach. Seeds and other vegetation in the Sub-Antarctic islands could easily be transported if clothing and boots are not cleaned thoroughly.
- 3.4 On returning to the ship, boots and clothing must be cleaned thoroughly at the boot washing station.

4. *The boot washing station:*

- 4.1 This is a facility on deck at the head of the gangway (or in close proximity to the point of return of passengers where Zodiacs, small landing crafts or helicopters are used). It requires:
 - Running water and a hose,
 - Drainage of water off the ship,
 - Scrubbing brush and or coarse mat and shallow tray by which all debris can be scrubbed from boots and clothing,
 - A member of staff or crew to assist passengers to inspect their boots and clothing for complete decontamination.
 - Use of an appropriate disinfectant.

5. *Between landings:*

- 5.1 Every effort must be made to ensure that boots and clothing dry out completely between landings. (Desiccation is an important mode of controlling some micro-organisms.)

6. *At the next pre-landing briefing:*

- 6.1 Passengers are reminded to check that boots and clothing are clean before leaving the ship.

Appendix B

Introduction and Detection of Diseases in Antarctic Wildlife: IAATO's Perspective

Preamble

Inherent in the mandate of IAATO member companies is a long term commitment to environmentally sensitive travel to Antarctica. For a number of years IAATO Members, being mindful of the Environmental Protocol and Recommendation XVIII-1, have used simple precautionary techniques to ensure that foreign material and/or potential pathogens are not introduced into Antarctica by tourists. In the last several years these procedures have been formalized and reviewed by national authorities via Environmental Impact Assessments.

Recognizing that tourists in Antarctica are a highly mobile population and that little is known about the introduction and translocation of alien organisms in the Antarctic, IAATO hopes to play a continuing active role in responding to new information.

Resulting from the Diseases of Antarctic Wildlife workshop hosted by the Australian Antarctic Division (Hobart, October 1998), this document is intended to address the concern about the potential translocation of diseases by tourists in Antarctica, and to suggest a cost effective, practical solution. Given the current lack of scientific data on natural disease status and microbial populations of Antarctic wildlife, and of methods to prevent anthropogenic transmission, a sensible precautionary approach is proposed.

Antarctic tour operators and staff can be a resource for disease surveillance, reporting and containment. Vessels operated by IAATO Members cover a wide variety of coastal terrain in a short space of time and can provide valuable data to the scientific community on the overall state of wildlife populations.

IAATO Members have continued to make use of boot-washing stations before and after each landing along with a visual check of clothing and gear for any exotic organisms. Following the Diseases of Antarctic Wildlife workshop, IAATO researched a simple effective antiseptic which could be used to limit possible translocation of diseases, such as in penguin faeces, when passengers moved from one rookery to another for example.

We were surprised to find that experts in the field do not agree whether any further action is required beyond simply washing boots and soiled clothing in clean water. A number of researchers suggested that a weak solution of iodine might be a suitable antiseptic. Bearing in mind the variance in opinion amongst experts in the field, IAATO suggests the following:

1. PREVENTIVE ACTION

- * Prior to their first landing in Antarctica, all passengers receive a comprehensive briefing on Antarctic conservation. An integral part of this briefing is explaining the importance of preventing the possible introduction of

foreign materials to Antarctica, and the potential for translocation between Antarctic sites.

* Before each shore visit passengers and staff are asked to check their clothing for seeds and other extraneous material and scrub their boots in a foot bath on the ship's deck. Given that most voyages depart from Ushuaia and many passengers spend time in Tierra del Fuego before embarkation, the opportunity to transport material to the Antarctic is obvious and a thorough cleaning before the first landing is particularly important.

* Following each landing for the duration of the voyage, passengers scrub boots at the water's edge prior to boarding Zodiacs or small landing crafts and again aboard the ship at the head of the gangway. The foot bath should contain a diluted iodine solution (ratio: three tablespoons of saturated solution to a ten gallon bucket) or virkon as proven effective in Appendix C, excerpts from *Identification Of An Agent Suitable For Disinfecting Boots Of Visitors To The Antarctic*.

* Disposal of the used iodine solution, which may possibly contain pathogens and is a poison, must be considered. Iodine occurs naturally in the ecosystem and is present in foot bath water in low enough concentrations that it is not considered a threat to the environment. We propose that dirty foot bath water should be disposed into the sea at the place of anchorage at each landing rather than flushed into the ship's tanks. In this way any contaminants acquired at that site will be returned to the waters from which they came, rather than being translocated.

* Zodiacs or small landing crafts are kept clean between landings and care is taken to remove stones, kelp etc. from the floor of the Zodiac or small landing crafts after each landing.

* Helicopter skids and passenger compartments are cleaned between landings using clean sea water.

2. PROCEDURES UPON THE DISCOVERY OF A HIGH MORTALITY EVENT

Antarctic tour vessels can potentially act as monitors of the health of wildlife populations, travelling along coastal areas throughout the Antarctic summer. We are not proposing that IAATO vessels take any formal responsibility of monitoring the health of wildlife populations but rather that IAATO instigates a code of practice for responding to a high mortality event.

While acknowledging that high mortality events are open to interpretation in size and cause, the critical issue is that any perceived, highly unusual event be noted and reported appropriately. In the event of discovering a mortality event, tour operators should:

* Describe and report the event to the nearest scientific station and ships operating in the area. The national authority that the tour organizer provided its advance notification should also be notified, and an incident report should

be prepared for IAATO.

* In such a scenario, the primary responsibility of the operator is to say that he/she has seen something unusual.

* Where the operator has reason to believe that landing passengers could lead to translocation of disease or may otherwise be ill-advised, the landing should be aborted.

* In the event of a landing being made and a mass mortality event not being recognized, then normal boot scrubbing procedures and adherence to approved landing procedures should be enough to minimize the risk of spreading disease.

Appendix C

[The following is excerpted from an article published in *Polar Record*, vol. 41, no. 216, Jan. 2005, p. 39-45. For a copy of the full paper visit a specialist polar reference library or contact C H Curry.]

IDENTIFICATION OF AN AGENT SUITABLE FOR DISINFECTING BOOTS OF VISITORS TO THE ANTARCTIC.

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“Introduction.

On the scale of biological time Antarctica has only very recently received visits by humans, and these in relatively small numbers. However, with the dissolution of the Soviet Union from 1991 a large number of ice-strengthened vessels and icebreakers became available for charter. This led to a rapid increase in the number of tourist operators conducting adventure ecotourism to the Antarctic. The International Association of Antarctica Tour Operators (IAATO) has documented that Antarctic tourist numbers doubled from 1995 to 2001, and may now be stabilising in the region of 10-12,000 per year (www.iaato.org) [at the time of this writing]. Tourist landings at penguin rookeries have become increasingly popular and operators typically offer several landings on a single voyage. Thus, there has been a large increase in the number of tourist visits to accessible penguin rookeries, particularly on the Antarctic Peninsula and to a lesser extent in the Ross Sea.

Tourists visiting the Antarctic come from all parts of the world. They are required to bring their own footwear, including waterproof boots, which may have been previously worn on farms or on hiking trips. As there are no quarantine inspections of tourists departing for Antarctica there exists the potential for visitors to introduce biological material from other environments. In addition tourists may cause the translocation within Antarctica of material which may be contaminated with pathogens (Anderson 1998).

It is widely recognised that exotic diseases can cause decline in native populations and even lead to the extinction of species. The effect on the Hawaiian land birds of the introduction of avian pox and malaria is well documented {Van Riper and others, 1986} {Warner, 1968}. The World Conservation Union considers that introduced organisms including those causing disease have accounted for more loss of species than has loss of habitat (The World Conservation Union, www.iucn.org/themes/ssc/pubs/policy/invasivesEng.htm).

Antarctica is vast, isolated and inhospitable. Few studies of the microflora of indigenous species have been undertaken, and still fewer of disease. A small number of mass mortality events have been observed in penguins, both on the continent and

on the sub-Antarctic islands. An example of the likely role of pathogenic organisms in disease of penguins is the isolation in pure cultures of the bacterium *Pasteurella multocida* from dead rockhopper penguins on sub-Antarctic Campbell Island. This pathogen has been observed on subsequent occasions {de Lisle and others, 1990}. A disease resembling the virus disease puffinosis was reported in gentoo penguins at Signy Island, where several hundred chicks were found dead {MacDonald and Conroy, 1971}. A mass mortality event involving about 65% of Adélie penguin chicks at Low Tongue near Mawson Station in 1972 had the features of an epizootic (an epidemic in animals) but no microbiology was conducted {Kerry and others, 1996}. Similarly, there have been a small number of mass mortality events observed in skuas and seals, but no cause identified {Laws and Taylor, 1957}. Biological invasions of the Antarctic have been extensively reviewed by Frenot and others (in press).

Concerns that humans, be they with scientific or with tourist operations, might introduce pathogens to Antarctic fauna led to a workshop on diseases of Antarctic wildlife in Hobart, Australia in October 1998. A report was presented to the Antarctic Treaty Consultative Meeting (ATCM) XX111 in 1999, and was considered by the Committee for Environmental Protection (CEP 11) in 2001. It concluded there was a significant risk and that consequences would likely be serious. There is a need to reduce the risk of disease introduction or spread among Antarctic fauna by humans.

The International Association of Antarctica Tour Operators (IAATO) is the industry self-regulating body for operators who land tourists in Antarctica. As part of its philosophy to minimise the impact of visits IAATO has developed guidelines for boot and clothing decontamination (iaato@iaato.com). These practices are similar to those of the quarantine authorities of countries such as Australia and New Zealand who protect themselves from the introduction of external organisms and diseases.

We tested the efficacy of the IAATO procedures in the Antarctic summer of 2000/2001 {Curry and others, 2002}. On two voyages to the Ross Sea, swabs were collected from tourist boots after visits to penguin rookeries, where faecal material (guano) inevitably collects on boots. Swabs were taken before landing to determine the baseline level of bacteria on boots, immediately on return to the ship to quantify the level of contamination, and after the boots were washed in sea water to determine the effect of this cleaning on recovery of organisms. Swabs were transported to the laboratory and cultured for bacteria. The results showed that cleaning boots in sea water is likely to be insufficient to prevent the translocation of pathogens and that further studies were needed to improve boot decontamination.

In response, we researched potentially suitable disinfectants for use on boots in the Antarctic. The specifications of a suitable agent are demanding. It must be widely used and accepted, effective in seawater at low temperature, biodegradable, easy to handle and inexpensive. The agent Virkon S, produced by Antec International (www.antechh.com/virkongd.html) was selected for testing. We report here the first study to evaluate the efficacy of Virkon S for boot disinfection in the Antarctic.

Conclusion:

There is much that is not known about the microbiology of the Antarctic. Still, less is known about infectious diseases in the native fauna. A small number of studies have

raised concerns that humans present a risk to this isolated environment by their capacity to introduce and translocate microorganisms. The recently increased numbers of visitors to concentrations of wildlife, and to penguin rookeries in particular, have heightened concern over this issue. The International Association of Antarctica Tour Operators has guidelines that attempt to limit the risk. This study has demonstrated that the guidelines can be improved by the addition of a disinfectant wash of visitors' boots. While uncertainty exists over the extent of the risk posed by visitors, be they tourists or scientists, it would be prudent to take steps to minimise the risk.

[Extensive Reference List follows the end of the published article.]

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