

The genomic epidemiology of shigellosis in South Africa

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Shigellosis, a leading cause of diarrhoeal mortality and morbidity globally, predominantly affects children under five years of age living in low- and middle-income countries. While whole genome sequence analysis (WGS) has been effectively used to further our understanding of shigellosis epidemiology, antimicrobial resistance, and transmission, it has been under-utilised in sub-Saharan Africa. In this study, we applied WGS to large sub-sample of surveillance isolates from South Africa, collected from 2011 to 2015, focussing on *Shigella flexneri* 2a and *Shigella sonnei*. We find each serotype is epidemiologically distinct. The four identified *S. flexneri* 2a clusters having distinct geographical distributions, and antimicrobial resistance (AMR) and virulence profiles, while the four sub-Clades of *S. sonnei* varied in virulence plasmid retention. Our results support serotype specific lifestyles as a driver for epidemiological differences, show AMR is not required for epidemiological success in *S. flexneri*, and that the HIV epidemic may have promoted *Shigella* population expansion.

Shigellosis is the second leading cause of diarrhoeal death, globally^{1,2}, with the greatest disease burden on those living in low- and middle-income countries^{1,2}. Of further concern is the high burden of disease among children under five years old (around 30% of cases and 38% of deaths), with repeat childhood infections bringing long-term health consequences, including stunted growth, impaired cognitive abilities, and chronic, functional bowel disorders^{3–10}.

The causative agents, a group of Gram-negative bacteria called *Shigella*, are convergently evolved specialised pathogens of *E. coli*¹¹. Made up of four serogroups (*S. flexneri*, *S. sonnei*, *S. boydii* and *S. dysenteriae*), they share an enteroinvasive pathogenesis mediated by acquisition of the large invasion, or virulence, plasmid (pINV)¹². Each serogroup is epidemiologically distinct, though *S. flexneri* and *S. sonnei* are of primary importance due to their global distribution and high prevalence (accounting for approximately 90% of the global shigellosis

burden)^{12–15}. The two serogroups are also genetically distinct; *S. sonnei* has only one serotype and is highly clonal, while *S. flexneri* is far more diverse genetically and serotypically (having >20 different serotypes)¹⁶. Whole genome sequence analysis (WGS) on large temporo-geographical collections of both serogroups has established new genomic nomenclatures, complementing traditional serological distinctions. These differentiate *S. flexneri* into eight phylogroups, and *S. sonnei* into five Lineages, and subsequently Clades and sub-Clades^{16,17}.

The serogroups are also thought to have distinct ecologies, with a switch from *S. flexneri* dominance to *S. sonnei* being linked with increasing industrialisation¹⁸. This may be due to reduced *Plasmodium shigelloides* exposure in industrialised settings leading to reduced cross-protection against *S. sonnei* from their shared O-antigen^{19,20}. Though differences in pathogen lifestyle may also be involved, genetic

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Epidemiology Of Theilerosis In Africa

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Epidemiology Of Theileriosis In Africa:

The Epidemiology of Theileriosis in Africa R. A. I. Norval, Brian D. Perry, A. S. Young, 1992-01-01 Theileriosis is the name given to infections caused by several species of Theileria the most important of which in Africa are Theileria annulata and Theileria parva Their distributions in the continent are distinct and follow that of their main field tick vectors The annulata occurs in North Africa and the Nile River Valley and the parva in sub Saharan eastern central and southern Africa This book reviews the work on theileriosis since 1902 from an historical biological ecological epidemiological and economic point of view The results shed new light on poorly understood areas in theileriosis and at the same time assist with the development of more robust control strategies Focuses on a tick borne parasite that threatens twenty five million cattle in Central and East Africa Assembles all current data on the epidemiology of theileriosis in Africa Lays the groundwork for future studies Theileriosis in Eastern, Central and Southern Africa International Laboratory for Research on Animal Diseases, 1989-01-01 Future of Livestock Industries in East and Southern Africa Jackson A. Kategile, S. Mubi, 1993-01-01 Trends in smallholder livestock enterprises The impact of the introduction of exotic cattle in East and southern Africa Intensive animal feeding practices for optimum feed utilisation Importance of strong research extension linkages in increasing livestock production in sub Saharan Africa Research on smallholder dairy research programmes in subhumid areas Dairy beef production systems research programme in Malawi Research on smallholder dairy production in coastal lowland Kenya Smallholder dairy on farm research in Burundi Smallholder dairy in Ethiopia Dual purpose goat research in western Kenya Contribution of crossbred goats to milk production and social welfare in Burundi Dairy goat research and extension at Sokoine University of Agriculture lowlands and Mgeta highlands areas of Tanzania Dual purpose cattle in central Tanzania Peri urban small scale dairy research programme in Botswana Research on small ruminant production systems in Zimbabwe Disease control approaches Economic implications of the control of East Coast fever in eastern central and southern Africa Immunisation of cattle against East Coast fever experiences in Zanzibar Sustainable control methods for ticks and tick borne diseases in Africa New vaccine strategies against heartwater Economics of trypanosomiasis control research implications Development of smallholder dairying Smallholder dairy production in Zambia Smallholder dairy development in Malawi Kenya National Dairy development project Dairy development programme in Tanga Tanzania Smallholder dairy development programme in resettled and communal areas in Zimbabwe Development of smallholder dairying in Zanzibar Marketing options for livestock products a total systems cum managerial perspective Other production systems Group ranch concept and practice in Kenya with special emphasis on Kajiado District Introduction of dairy cattle production systems in soil conservation areas Wool and mohair production in Lesotho Synthesis of constraints to livestock research and development and recommendations Ecological Dynamics of Tick-Borne Zoonoses Daniel E. Sonenshine, Thomas N. Mather, 1994-10-20 The ecological relationships found to exist between tick vectors and pathogens in

their zootic cycle can profoundly influence patterns of transmission and disease for humans and domestic animals This book examines the ecological parameters affecting the conservation and regulation of tick borne zoonoses as well as the geographic and seasonal distributions of those infections Written by an eminent authority on the subject the book will be sought after by students and researchers in ecology invertebrate zoology parasitology entomology public health and epidemiology

Ecology and Management of the African Buffalo Alexandre Caron, Daniel Corn  lis, Philippe Chardonnet, Herbert H. T. Prins, 2023-11-23 One of Africa's Big Five the African buffalo is the largest African bovine or antelope that occurs throughout most of sub Sahara and in a wide range of ecosystems from savanna to rainforest The African buffalo is also one of the most successful large African mammals in terms of abundance and biomass This species thus represents a powerful model to enhance our understanding of African biogeography and wildlife conservation ecology and management Edited by four researchers experienced in different aspects of the African buffalo's biology this volume provides an exhaustive compilation of knowledge on an emblematic species that stands out as an important component of African natural and human ecosystems It delivers a global view of the African buffalo and all known aspects of its ecology and management This book will appeal to students scholars scientists and wildlife managers as well as those enthusiastic about the charismatic species This title is also available as Open Access on Cambridge Core

Ticks and Tick-borne Disease Control Organization of African Unity, 1993-01-01

Impact of Science on African Agriculture and Food Security P. Anandajayasekaram, 2007 The need for agricultural research resources in the developing world cannot be underestimated but the availability of such resources is often poor due to lack of funding and investment In order for Africa and other such developing countries to achieve productivity in agriculture vital to food security poverty reduction and sustainable management of natural resources investment and policy development needs to be assessed This book a joint effort from IFPRI ILRI and the Kellogg Foundation explores the importance of impact assessment studies in Africa and assembles important evidence to pave the way for further much needed investment in agricultural research all over the developing world

Achievements and Impact of ILRAD's Research and Research Related Programmes International Livestock Research Institute, Advances in Disease Vector Research, 2012-12-06 Volume 10 of *Advances in Disease Vector Research* consists of seven chapters on vectors that affect human or animal health and six chapters on plant pathogens and their vectors In Chapter 1 Yasuo Chinzei and DeMar Taylor discuss hormonal regulation of vitellogenesis in ticks Many blood sucking insects and ticks transmit pathogens by engorgement which induces vitellogenesis and oviposition in adult animals To investigate the pathogen transmission mechanism in vector animals information on the host physiological and endocrinological conditions after engorgement is useful and important because pathogen development or proliferation occurs in the vector hosts at the same time as the host reproduction Chinzei and Taylor have shown that in ticks juvenile hormone JH is not involved in the endocrinological processes inducing vitellogenin biosynthesis Synganglion tick brain factor s

vitellogenesis inducing factor VIF is more important to initiate vitellogenesis after engorgement and ecdysteroids are also related to induction of vitellogenin synthesis In their chapter based mainly on their own experimental data the authors discuss the characterization of main yolk protein vitellogenin Vg biosynthesis and processing in the fat body and hormonal regulation of Vg synthesis in tick systems including ixodid and argasid ticks *Encyclopedia of Arthropod-transmitted Infections of Man and Domesticated Animals* R. W. Ashford,2001-10-19 This major reference work contains essential information on arthropod borne infections affecting humans and domesticated animals The encyclopedia is a key reference source for anyone working in medical and veterinary science and related fields Features of The Encyclopedia of Arthropod transmitted Infections are 150 entries describing arboviral viral bacterial and rickettsial spirochaetal protozoal and filarial infections and the vectors that transmit them Information on disease distribution clinical symptoms diagnosis transmission cycles vector life cycles and treatment and control measures Figures tables and photographs illustrate the text Following each entry is a selected bibliography to aid further reading on the topic Over 80 different international authors with expertise in medicine veterinary science parasitology entomology epidemiology microbiology and zoology have contributed to the encyclopedia **ILRAD annual report 1992** International Laboratory for Research on Animal Diseases, **Genetics of Apicomplexans and Apicomplexan-Related Parasitic Diseases** Moses Okpeku, Matthew Adekunle Adeleke, Jun-Hu Chen, 2022-03-28 **Wildlife Conservation by Sustainable Use** H.H.T Prins, Jan Geu Grootenhuys, Thomas T. Dolan, 2012-12-06 One of the major challenges of sustainable development is the interdisciplinary nature of the issues involved To this end a team of conservation biologists hunters tourist operators ranchers wildlife and land managers ecologists veterinarians and economists was convened to discuss whether wildlife outside protected areas in Africa can be conserved in the face of agricultural expansion and human population growth They reached the unequivocal if controversial conclusion that wildlife can be an economic asset especially in the African savannas if this wildlife can be sustainably utilized through safari hunting and tourism Using the African savannas as an example *Wildlife Conservation by Sustainable Use* shows that in many instances sustainable wildlife utilization comprises an even better form of land use than livestock keeping Even when population pressure is high as in agricultural areas or in humid zones and wild animal species can pose a serious cost to agriculture these costs are mainly caused by small species with a low potential for safari hunting Although ranching has a very low rate of return and is hardly ever profitable the biggest obstacle to the model of sustainable wildlife use outlined in *Wildlife Conservation by Sustainable Use* is from unfair competition from the agricultural sector such as subsidies and lack of taxation resulting in market distortion for wildlife utilization This book thus gives valuable evidence for a different way of working providing arguments for removing such distortions and thereby facilitating financially sound land use and making it a rationally sound choice to conserve wildlife outside protected areas The expert team of authors most of whom came together at a workshop to thrash out the ideas that were then developed into the various chapters has written a superb

account of recent research on this complex subject resulting in a book that is a major contribution to our understanding of sustainable use of land The important conclusion is that wildlife conservation can be possible for landholders and local communities if they have a financial interest in protecting wildlife on their lands *Western medicine as contested knowledge* Andrew Cunningham, Bridie Andrews, 2021-06-15 Medicine has always been a significant tool of an empire This book focuses on the issue of the contestation of knowledge and examines the non Western responses to Western medicine The decolonised states wanted Western medicine to be established with Western money which was resisted by the WHO The attribution of an African origin to AIDS is related to how Western scientists view the disease as epidemic and sexually threatening Veterinary science when applied to domestic stock opens up fresh areas of conflict which can profoundly influence human health Pastoral herd management was the enemy of land enclosure and efficient land use in the eyes of the colonisers While the native Indians of the United States were marginal participants in the delivery or shaping of health care the Navajo passively resisted Western medicine by never giving up their own religion medicine The book discusses the involvement of the Rockefeller Foundation in eradicating the yellow fever in Brazil and hookworm in Mexico The imposition of Western medicine in British India picked up with plague outbreaks and enforced vaccination The plurality of Indian medicine is addressed with respect to the non literate folk medicine of Rajasthan in north west India The Japanese have been resistant to the adoption of the transplant practices of modern scientific medicine Rumours about the way the British were dealing with plague in Hong Kong and Cape Town are discussed Thailand had accepted Western medicine but suffered the effects of severe drug resistance to the WHO treatment of choice in malaria Compendium of ILRI research impacts and adoption, 1975-1998 P. K. Thornton, 1998-01-01 Impact of chemoprophylactic control of trypanosomosis in coastal Kenya Economic impact of N Dama cattle in tsetse affected areas of Zaire Togo Ethiopia and The Gambia Adoption of dairy feeding management in the Ethiopian highlands Costs and benefits of alternative theileriosis control strategies in Zimbabwe Impacts of east coast fever immunisation in coastal and highland Kenya Fodder bank adoption in northern Nigeria Impact of land tenure on adoption of alley farming in West Africa Impact of crossbred dairy draft technology in Ethiopia Impact of livestock on alley farming systems in West Africa Impact of dairy intensification on Africa peri urban milk production systems Constraints to use of animal traction in semi arid West Africa Impacts of dairy intensification on nutrition and health in coastal Kenya Economic impact of theileriosis and its control in Africa **Apicomplexa in Livestock** Johann Schröder, 2023-08-31 The Apicomplexa is a globally prevalent group of parasitic protozoa that cause disease from malaria in humans to livestock diseases such as coccidiosis babesiosis Red Water Tick Fever and East Coast Fever With significant economic impacts a number of Apicomplexa are also zoonotic leading to grave potential public health consequences Infection prevention efforts by immunisation or management of arthropod vector infestation have not been universally successful and can have knock on effects such as pollution of the environment and human food chain and development of insecticidal or

acaricidal resistance This book highlights the similarities and differences between the various Apicomplexa infections identifying those of greatest significance and suggesting sustainable approaches to better manage their impact on livestock productivity Suitable for researchers and students of veterinary parasitology and related disciplines this book is a valuable resource covering this important set of parasites

The Encyclopedia of Medical and Veterinary Entomology Richard C. Russell, Domenico Otranto, Richard L. Wall, 2013 Arthropod transmitted infections continue to be a front line issue in all regions of the world Understanding the insects that transmit diseases the mechanisms of infection and the resulting diseases is vital to doctors veterinarians public health workers and disease control agencies This major reference examines the biology classification and control of arthropods that cause disease in animals and humans The morphology taxonomy and phylogeny of fleas flies lice mites midges mosquitoes and ticks are described with descriptions of their medical and veterinary significance diseases they cause insect distribution and global disease spread Updated developed and reworked from Doug Kettle's seminal Medical and Veterinary Entomology this major new reference presents vital information in encyclopedia format with alphabetical entries and an extensive index to make key facts easy to find This new treatment of the subject provides accessible content and up to date research illustrated by line drawings and color photographs

Tick Vector Biology Bruce Fivaz, Trevor Petney, Ivan Horak, 2012-12-06 The book provides a comprehensive account of ticks and tick borne diseases occurring in tropical and subtropical areas It begins with a complete up to date overview of the systematics of the Ixodida Ixodidae Argasidae and Nuttalliellidae and is followed by a review of the problem of ticks and tick borne diseases of domestic animals world wide This leads on to multi disciplinary approaches to planning tick and tick borne disease control and to contributions on calculating the economic impact of a tick species such as *Amblyomma americanum* on beef production systems Heartwater fever cowdriosis and dermatophilosis are endemic in Africa and pose a threat to the North American mainland The epidemiology of these two diseases is discussed in detail as is the role of frozen vaccines to control bovine babesiosis and anaplasmosis The book also includes chapters on tick transmitted zoonoses such as Lyme borreliosis tick typhus and ehrlichiosis It concludes with a review of the acaricidal treatment of tick infestation

Combating and Controlling Nagana and Tick-Borne Diseases in Livestock Orege, Caleb Oburu, 2021-01-29 African animal trypanosomiasis AAT also called nagana is a trans boundary disease that has had an immense impact on cattle and is ranked among the top global cattle diseases This and tick borne diseases have caused major obstacles to sustainable livestock based agricultural production and food security and are important factors in underdevelopment Due to decreasing efficacy of available drugs widespread trypanosome resistance and the difficulty of sustaining other control measures there is a need for alternative sustainable strategies to reduce the impact these diseases have on livestock Combating and Controlling Nagana and Tick Borne Diseases in Livestock provides the latest empirical research findings on the effects of African animal trypanosomiasis nagana and tick borne disease infection in livestock their impact on farmer livelihoods and

the measures that can be undertaken to mitigate negative effects and reduce the number of infections While highlighting topic areas such as disease history and transmission treatments and the economic impacts this book is essential for farmers animal health and animal production professionals and practitioners non government organizations researchers academicians and students working in fields that include but are not limited to agriculture livestock production environmental science veterinary medicine veterinary pathology and epidemiology **African Ecology** Clive Spinage, 2012-05-07 In view of the rapidly changing ecology of Africa this work provides benchmarks for some of the major and more neglected aspects with an accent on historical data to enable habitats to be seen in relation to their previous state forming a background reference work to understanding how the ecology of Africa has been shaped by its past Reviewing historical data wherever possible it adopts an holistic view treating man as well as animals with accent on diseases both human and animal which have been a potent force in shaping Africa s ecology a role neglected in ecological studies

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