UNIVERSITI PUTRA MALAYSIA

TEA LEAF [CAMELLIA SINENSIS (L.) KUNTZE] EXTRACTSYNTHESIZED SILVER NANOPARTICLES AS ANTIMICROBIAL AGENT AGAINST FOODBORNE PATHOGENS

LOO YUET YING

FSTM 2018 25

TEA LEAF [*CAMELLIA SINENSIS* (L.) KUNTZE] EXTRACT-SYNTHESIZED SILVER NANOPARTICLES AS ANTIMICROBIAL AGENT AGAINST FOODBORNE PATHOGENS

By

LOO YUET YING

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfillment of the Requirements for the Degree of Doctor of Philosophy

July 2018

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfillment of the requirement for the degree of Doctor of Philosophy

TEA LEAF [*Camellia sinensis*(L.) Kuntze] EXTRACT-SYNTHESIZED SILVER NANOPARTICLES AS ANTIMICROBIAL AGENT AGAINST FOODBORNE PATHOGENS

By

LOO YUET YING

July 2018

Chairman : Professor Son Radu, PhD
Faculty : Food Science and Technology

Foodborne illness has emerged as an important public health problem in many countries in the last decade. The main purpose of this research is to study the antibacterial activity of silver nanoparticles against foodborne pathogens. Silver nanoparticles (AgNP) are well-known as antimicrobial agents due to their strong biocidal effect against microbial species. In this study, the synthesis of AgNP using the Chinese tea extracts from *Camellia sinensis* was reported. The synthesized nanoparticles were characterized using UV-vis spectroscopy, X-ray diffraction (XRD), transmission electron microscopy (TEM), and fourier transform infrared (FTIR) spectroscopy. The XRD analysis shows that the synthesized AgNP are of face-centered cubic structure. Well-dispersed AgNP with an approximate size of 4 nm were observed in the TEM image. The antibacterial activity of silver nanaoparticles was tested against 12 foodborne pathogens namely *Escherichia coli*, *Escherichia coli* O157:H7, *Klebsiella pneumoniae, Staphylococcus aureus, Bacillus cereus, Salmonella* Typhimurium, *Salmonella* Enteritidis, *Enterococcus faecalis, Enterococcus durans, Listeria monocytogenes, Bacillus subtilis*subsp. *spizizenii,* and Methicillin-resistant *Staphylococcus aureus.* The antibacterial activity of AgNPs was determined by using disc diffusion method, resazurin microtitre-plate assay (minimum inhibitory concentration, MIC), minimum bactericidal concentration test (MBC), and time-kill curve assay.The disc diffusion test showed that all the foodborne pathogens were susceptible to AgNPs. The MIC and MBC value of AgNPs against these 12 foodborne pathogens were ranged from 3.9 to 15.6µg/mL. The time kill activity of AgNPs against these foodborne pathogens was tested; the reduction in the number of CFU/ml was >3 log10 units (99.9%) in 1-2 h. This study indicates that AgNPs has antibacterial activity. The toxicity study using the brine shrimp nauplii demonstrated that AgNPs have medium toxic to *A. salina* (LC_{50} = 107.52 µg/mL). The applications of AgNPs were done by adding AgNPs into the washing-up liquid as an antibacterial additive in washing the artificially contaminated chopping board. Washing the artificially contaminated chopping board by using washing-up liquid with AgNPs reduced the bacteria count by 1.60 ± 0.11 $\log_{10}$ CFU/g for *S. aureus*; while for *S.* Typhimurium, the bacteria count was reduced

by 2.90 ± 0.02 $\log_{10}$ CFU/g. The decontamination efficacy of washing using washing-up liquid with AgNPs was found to be significant ($P< 0.05$) and the most effective way in reducing the microbial contamination in chopping board. This is the first report to demonstratethat the application of AgNPs in washing-up liquid has significant antibacterial activity against foodborne pathogens. Overall, the findings show that AgNPs have strong antibacterial activity and can be an alternative antimicrobial agent.

Abstrak tesis yang dikemukakan kepadaSenatUniversiti Putra Malaysia sebagai memenuhi keperluan untuk Ijazah Doktor Falsafah

NANOPARTIKEL PERAK YANG DISISNTESIS OLEH DAUN TEH [*Camellia sinensis* (L.) Kuntze] EKSTRAK SEBAGAIAGEN ANTIMIKROBIAL TERHADAP PATOGEN BAWAAN MAKANAN

Oleh

LOO YUET YING

Julai 2018

Pengerusi : Professor Son Radu, PhD
Fakulti : Sains dan Teknologi Makanan

Penyakit bawaan makanan telah muncul sebagai satu masalah kesihatan awam di kebanyakan Negara sejak dekad yang lalu. Tujuan utama kajian ini adalah untuk mengkaji antibakteria aktiviti nanopartikel perak terhadap penyakit bawaan makanan. Nanopartikel perak telah dikenali sebagai agen antimikrobial adalah disebabkan oleh kesan biocidalnya yang kuat terhadap spesis microbial. Dalam kajian ini, nanopartikel perak telah disintesis menggunakan ekstrak daun teh cina dari *Camellia sinensis* dilaporkan. Nanopartikel perak yang disintesis telah dicirikan dengan spektroskopi UV-vis, pembelauan sinar-X (XRD), spektroskopi jelmaan Fourier inframerah (FTIR), dan mikroskop electron penghantaran (TEM). Analisis XRD menunjukkan nanopartikel perak mempunyai struktur berpusatkan muka padu. Permerhatian imej TEM menunjukkan nanopartikel perak yang terdispersi dengan baik mempunyai purata saiz 4 nm. Antibakteria aktiviti nanopartikel perak telah diuji terhadap 12 patogen bawaan makanan iaitu *Escherichia coli, Escherichia coli* O157:H7, *Klebsiella pneumoniae, Staphylococcus aureus, Bacillus cereus, Salmonella* Typhimurium, *Salmonella* Enteritidis, *Enterococcus faecalis, Enterococcus durans, Listeria monocytogenes, Bacillus subtilis*subsp. *spizizenii,* dan Methicillin-resistant *Staphylococcus aureus.* Antibakteria aktiviti nanopartikel perak telah ditentukan dengan menggunakan kaedah penyebaran cakera, ujian penentuan nilai kepekatan perencatan minimum (MIC), ujian penentuan nilai kepekatan minimum bakterisidal (MBC), dan asai waktu-membunuh. Ujian penyebaran cakera menunjukkan semua patogen bawaan makanan rentan terhadap nanopartikel perak. Nilai-nilai MIC dan MIC nanopartikel perak untuk 12 patogen bawaan makanan adalah dalam lingkungan antara 3.9 – 15.6 µg/mL. Aktiviti waktu membunuh nanopartikel perak terhadap pathogen bawaan makanan telah diuijikan; pengurangan nombor CFU/mL adalah>3 log10 unit (99%) dalam 1-2 jam. Kajian ini menunjukkan nanopartikel perak mempunyai antibakteria aktiviti. Kajian sitotoksisiti telah diuji menggunakan nauplii udang air garam menunjukkan nanopartikel perak mempunyai sederhana toksik terhadap *A. salina* (LC_{50} = 107.52 µg/mL). Aplikasi nanopartikel perak telah dilakukan dengan menambahkan nanopartikel perak ke dalam cecair pembersih sebagai aditif antibakteria dalam pembasuhan papan pencincang yang

dicemari secara buatan. Pembasuhan papan pencincang yang dicemari secara buatan dengan menggunakan cecair pembersih yang mengandungi nanopartikel perak telah mengurangkan bilangan bakteria sebanyak 1.60 ± 0.11 $\log_{10}$ CFU/g untuk *S. aureus*; manakala untuk *S.* Typhimurium, bilangan bakteria telah dikurangkan sebanyak 2.90 ± 0.02 $\log_{10}$ CFU/g. Keberkesanan dekontaminasi basuh menggunakan cecair pembersih yang mengandungi nanopartikel perak telah dijumpai signifikan ($P< 0.05$) dan cara yang paling berkesan dalam mengurangkan pencemaran mikroorganisma dalam papan pencincang. Ini merupakan laporan yang pertama untuk menunjukkan aplikasi nanopartikel perak dalam cecair pembersih mempunyai antibakteria aktiviti yang signifikan terhadap patogen-patogen bawaan makanan. Secara keseluruhan, penemuan-penemuan ini menunjukkan nanopartikel perak mempunyai antibacteria aktiviti yang kuat dan boleh dijadikan sebagai satu alternatif agen antimikrobial.

ACKNOWLEDGEMENTS

First of all, I would like to express my gratitude and appreciation to my supervisor, Professor Dr. Son Radu for his supervision, guidance, comments, advises and encouragement throughout my study.

My sincere thanks to my co-supervisors, Associate Professor Dr. Yaya Rukayadi and Dr. Nor Khaizura Binti Mahmud @ Ab Rashid from Faculty of Food Science and Technology, UPM for their invaluable assistance, advises and also willingness to share their experience with me during my PhD study.

A special thanks to all my laboratory colleagues and my dear friends for their help and supports while running my project. Sincere thanks to all the staffs in Faculty of Food Science and Technology, UPM who helped me throughout the duration of the project.

It is a pleasure to thank those who have provided me with financial support over these past years. I would like to sincerely acknowledge MyBrain 15 (MyPhD) scholarship, which supported me throughout my PhD study.

Last but not least, I would like to express my deepest gratitude to my beloved family and my husband for their continuous understanding and moral support throughout the period of my study.

This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfillment of the requirement for the degree of Doctor of Philosophy. The members of the Supervisory Committee were as follows:

Son Radu, PhD
Professor
Faculty of Food Science and Technology
Universiti Putra Malaysia
(Chairman)

Yaya Rukayadi, PhD
Associate Professor
Faculty of Food Science and Technology
Universiti Putra Malaysia
(Member)

Nor Khaizura Mahmud @ Ab Rashid, PhD
Senior Lecturer
Faculty of Food Science and Technology
Universiti Putra Malaysia
(Member)

_____
ROBIAH BINTI YUNUS, PhD
Professor and Dean
School of Graduate Studies
Universiti Putra Malaysia

Date:

Declaration by Members of Supervisory Committee

This is to confirm that:

- the research conducted and the writing of this thesis was under our supervision;
- supervision responsibilities as stated in the Universiti Putra Malaysia (Graduate Studies) Rules 2003 (Revision 2012-2013) are adhered to.

Signature: _____
Name of
Chairman of
Supervisory Committee: Professor. Dr. Son Radu

Signature: _____
Name of
Member of
Supervisory
Committee: Assoc. Prof. Dr. YayaRukayadi

Signature: _____
Name of
Member of
Supervisory
Committee: Dr. NorKhaizura Mahmud @ Ab Rashid

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

AgNPs	Silver nanoparticles
$AgNO_3$	Silver nitrate
ATCC	American Type Culture Collection
CDCIS	Communicable Diseases Control Information System
CFU	Colony forming unit
CLSI	Clinical and Laboratory Standards Institute
CPRC	Crisis Preparedness and Response Centre
CPS	Capsule polysaccharide
DNA	Deoxyribonucleic acid
DAEC	Diffuse-adhering *Escherichia coli*
EAEC	Enteroaggregative *Escherichia coli*
EHEC	Enterohaemorrhagic *Escherichia coli*
EIEC	Enteroinvasive *Escherichia coli*
EPEC	Enteropathogenic *Escherichia coli*
ETEC	Enterotoxigenic *Escherichia coli*
FTIR	Fourier−Transform Infrared
h	hour
HUS	Hemolytic uraemic syndrome
kV	kilovolts
MBC	Minimal bactericidal concentration
MIC	Minimal inhibitory concentration
MHB	Mueller Hinton broth
min	minute
MOH	Ministry of Health
MRSA	Methicillin-resistant *Staphylococcus aureus*
MTT	3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide
NAG	*N*-acetyl glucosamine
NAM	*N*-acetyl muramic acid
nm	nanometer
PBP	Penicillin-binding protein
PCR	Polymerase chain reaction
RNA	Ribonucleic acid
ROS	reactive oxygen species

rpm	Revolutions per minute
SEM	Scanning Electron Microscopy
TEM	Transmission Electron Microscopy
TSA	Trypticase soy agar
TSB	Tryptic soy broth
UPM	Universiti Putra Malaysia
WHO	World Health Organization
x g	Unit gravity

CHAPTER 1

INTRODUCTION

1.1 Background

Foodborne illness is caused by consuming food contaminated with bacteria, viruses or chemicals. However, the most important source of foodborne illness is mainly related to the consumption of bacterial contaminated foods(Su *et al.*, 2005). Food especially minimal-processed food can be contaminated during pre-harvesting, post-harvesting, processing, transport, handling or preparation. The most common foodborne pathogens found in food are *Salmonella* spp.(Lee *et al.*, 2015; D'Ostuni *et al.*, 2016), *Listeria* spp. (Ferreira *et al.*, 2014; Välimaa *et al.*, 2015), *Escherichia coli* O157(Heiman *et al.*, 2015), *Campylobacter* spp. (Kaakoush *et al.*, 2015) and *Clostridia* spp. (Chukwu *et al.*, 2016).

Recently, nanotechnology has emerged as a dynamically developing area of scientific interest in the world. Nanoparticles such as silver nanoparticles (AgNPs) are well-known to exhibit a strong antimicrobial activity against various microorganisms such as bacteria, viruses and fungi due to its smaller in size and large surface area(Franci *et al.*, 2015).Synthesis of AgNPs employing either biological microorganisms or plant extracts has emerged as a simple and alternative to chemical synthesis. Biological or plant extracts-mediated synthesis method provides advancements over chemical methods as it is environmental friendly and cost effective. Plant extracts-mediated synthesis of AgNPs can be advantageous compared with other biological processes as it does not require the process of maintaining the cell cultures and aseptic environments(Loo *et al.*, 2012). Several studies on the green synthesis of AgNPs using plant extracts have been reported (Medda *et al.*, 2015; Ahmed *et al.*, 2016; Dhand *et al.*, 2016; Selvam *et al.*, 2017).

Tea is a well-known beverage which produced from the plant *Camellia sinensis*. There are 3 types of tea: green tea (non-fermented), Oolong tea (semi-fermented) and black tea (fully fermented) (Liu *et al.*, 2015). According to Sentkowska *et al.* (2017), approximately 80% of all teas consumed is black tea. The leaves of *Camellia sinensis* contain polyphenolic compounds which known as tea catechins. The phenolic compounds in teas contain high antioxidants properties which are good in reducing metal ions. Thus, the phenolic compounds could act as the reducing and capping agents in the process of synthesis silver nanoparticles(Senthilkumar *et al.*, 2014).

Minimal inhibitory concentration (MIC)and minimal bactericidal concentration (MBC) have been used to evaluate the *in vitro* activity of new antimicrobial agents. MIC value of an antimicrobial agent is determined by broth dilution in 96-well microtitration plate while MBC value is determined by using an antibiotic free culture plate. Well- and disc-diffusion methods have been reported as qualitative indicators for testing the antimicrobial activity (Yemoa *et al.*, 2011). Time-kill assay

is a method in determining the bactericidal or fungicidal effect. The testing methods are standardised and described by the Clinical and Laboratory Standards Institute (CLSI)M100-S22 for antibiotic testing (CLSI, 2012).

Nanotoxicology research is important as the widely used of nanoparticles have increased the exposure of living organisms to nanoparticles direct- or indirectly. Brine shrimp lethality assay has been served as the alternative biological assay in evaluating the toxicity effect of AgNPs. Brine shrimp (*Artemia salina*) is the most widely used species among all the *Artemia* species. *Artemia* species have been applied as an experimental test organism in over 90% of the toxicological test (Hamidi *et al.*, 2014). Several studies reported that brine shrimps as the most suitable test organisms for toxicological test due to its rapid screening technique, simple, convenience, no aseptic technique required and cost-effective(Arulvasu *et al.*, 2014; Rajabi *et al.*, 2015; Phull *et al.*, 2016; Rajakumar *et al.*, 2017).

Several studies reported that cross contamination from raw product through different surfaces such as hands(Jensen *et al.*, 2017), dishcloth(Mazengia *et al.*, 2015), stainless steel utensils (Erickson *et al.*, 2015; Kuda *et al.*, 2016), and cutting board (Goh *et al.*, 2014; Faour-Klingbeil *et al.*, 2016)increased the risk of getting foodborne illnesses. Cutting board and utensils used in domestic kitchen are reported as the potential reservoirs for foodborne pathogens (Cliver, 2006; Kuan *et al.*, 2017). Washing is the important process during food preparation in reducing the risk of foodborne infections. Washing-up liquid with antibacterial agent is required as it helps in eliminating the food residues and microbial load on the kitchen utensil such as chopping board.

1.2 Problem Statement

Foodborne illness has increased in recent years. Foodborne illness is mostly caused by the consumption of bacteria contaminated foods. Cross-contamination during processing or food preparation is one of the causes of food contamination and lead to foodborne illness. Kitchen utensils such as cutting board in domestic kitchen should be washed properly by using antibacterial washing-up liquid as they could be a vehicle for the transmission of foodborne pathogens. However, bacteria may exhibit multiple drug resistance where the bacteria species are able to multiply after exposure to several types of antibiotics. Widely misuse and abuse of antibiotics are the leading cause of antibiotic resistance in the bacteria (O'Bryan *et al.*, 2018). Multidrug resistant bacteria infection may lead to several impacts including increase of mortality and morbidity rates, prolong of hospitalization period, and economic loss (Patel *et al.*, 2008). Thus, the development of a new and natural antimicrobial agent is needed as there is a growing concern in multidrug resistant foodborne pathogens. Synthesis of silver nanoparticles by tea extracts are reported as a simple, inexpensive and environmental friendly process. Silver nanoparticles are able to eliminate the bacteria as the nanoparticles are less likely to develop resistance in bacteria than antibiotics. Using tea extract-synthesized silver nanoparticles as antibacterial additive in washing-up liquid for cutting board, the bacteria can be reduced.

1.3 Objectives

The objectives of this study are:

1. to synthesis the silver nanoparticles by black tea leaves extracts
2. to determine the antibacterial activity of green synthesized silver nanoparticles against a diverse range of Gram-negative and Gram-positive foodborne pathogens
3. to evaluate the toxicity effect of tea leaves extracts synthesized AgNPs
4. to evaluate the effectiveness of AgNPs as an antibacterial additive in washing-up liquid

REFERENCES

Abou El-Nour, K. M. M., Eftaiha, A., Al-Warthan, A., & Ammar, R. A. A. (2010). Synthesis and applications of silver nanoparticles. *Arabian Journal of Chemistry, 3*(3), 135-140.

Agasti, N., & Kaushik, N. K. (2014). One pot synthesis of crystalline silver nanoparticles. *American Journal of Nanomaterials, 2*(1), 4-7.

Agnihotri, S., Mukherji, S., & Mukherji, S. (2014). Size-controlled silver nanoparticles synthesized over the range 5–100 nm using the same protocol and their antibacterial efficacy. *RSC Advances, 4*(8), 3974-3983.

Ahmad, M. B., Lim, J. J., Shameli, K., Ibrahim, N. A., Tay, M. Y., & Chieng, B. W. (2012). Antibacterial activity of silver bionanocomposites synthesized by chemical reduction route. *Chemistry Central Journal, 6*(1), 101.

Ahmad, N., Sharma, S., Alam, M. K., Singh, V., Shamsi, S., Mehta, B., & Fatma, A. (2010). Rapid synthesis of silver nanoparticles using dried medicinal plant of basil. *Colloids and Surfaces B: Biointerfaces, 81*(1), 81-86.

Ahmed, S., Ahmad, M., Swami, B. L., & Ikram, S. (2016). A review on plants extract mediated synthesis of silver nanoparticles for antimicrobial applications: a green expertise. *J. Adv. Res, 7*(1), 17-28.

Ak, N. O., Cliver, D. O., & Kaspar, C. W. (1994). Decontamination of plastic and wooden cutting boards for kitchen use. *Journal of Food Protection, 57*(1), 23-30.

Alghuthaymi, M. A., Almoammar, H., Rai, M., Said-Galiev, E., & Abd-Elsalam, K. A. (2015). Myconanoparticles: synthesis and their role in phytopathogens management. *Biotechnology & Biotechnological Equipment, 29*(2), 221-236.

Amerasan, D., Nataraj, T., Murugan, K., Panneerselvam, C., Madhiyazhagan, P., Nicoletti, M., & Benelli, G. (2016). Myco-synthesis of silver nanoparticles using Metarhizium anisopliae against the rural malaria vector Anopheles culicifacies Giles (Diptera: Culicidae). *Journal of pest science, 89*(1), 249-256.

Andrews, H. L., & Baumler, A. J. (2005). *Salmonella* species. In Fratamico, P. M., Bhunia, A. K., andSmith, J. L. (Eds.), *Foodborne Pathogens: Microbiology and Molecular Biology* (pp. 327-339): Horizon Scientific Press.

Angelo, K., Conrad, A., Saupe, A., Dragoo, H., West, N., Sorenson, A., Barnes, A., Doyle, M., Beal, J., & Jackson, K. (2017). Multistate outbreak of *Listeria monocytogenes* infections linked to whole apples used in commercially produced, prepackaged caramel apples: United States, 2014–2015. *Epidemiology & Infection, 145*(5), 848-856.

Angelo, K. M., Chu, A., Anand, M., Nguyen, T.-A., Bottichio, L., Wise, M., Williams, I., Seelman, S., Bell, R., & Fatica, M. (2015). Outbreak of *Salmonella* Newport infections linked to cucumbers--United States, 2014. *MMWR. Morbidity and mortality weekly report, 64*(6), 144-147.

Antunes, P., Mourão, J., Campos, J., & Peixe, L. (2016). Salmonellosis: the role of poultry meat. *Clinical Microbiology and Infection*, *22*(2), 110-121.

Apetroaie‐Constantin, C., Mikkola, R., Andersson, M., Teplova, V., Suominen, I., Johansson, T., & Salkinoja‐Salonen, M. (2009). *Bacillus subtilis* and *B. mojavensis* strains connected to food poisoning produce the heat stable toxin amylosin. *Journal of applied microbiology*, *106*(6), 1976-1985.

Arulvasu, C., Jennifer, S. M., Prabhu, D., & Chandhirasekar, D. (2014). Toxicity effect of silver nanoparticles in brine shrimp *Artemia*. *The Scientific World Journal*, *2014*, 1-10.

Asharani, P., Wu, Y. L., Gong, Z., & Valiyaveettil, S. (2008). Toxicity of silver nanoparticles in zebrafish models. *Nanotechnology*, *19*(25), 255102-255109.

Astro, A. (2015). Kelantan records 151 typhoid cases as of Oct 31. Retrieved November 2017 http://english.astroawani.com/malaysia-news/kelantan-records-151-typhoid-cases-oct-31-80027

Astro, A. (2016). Perak records over 1000 food poisoning cases in schools since January. Retrieved November 24, 2017 http://english.astroawani.com/malaysia-news/perakrecords-over-1-000-food-poisoning-cases-schoolsjanuary-119273

Ates, M., Daniels, J., Arslan, Z., & Farah, I. O. (2013). Effects of aqueous suspensions of titanium dioxide nanoparticles on *Artemia salina*: assessment of nanoparticle aggregation, accumulation, and toxicity. *Environmental monitoring and assessment*, *185*(4), 3339-3348.

Atiyeh, B. S., Costagliola, M., Hayek, S. N., & Dibo, S. A. (2007). Effect of silver on burn wound infection control and healing: review of the literature. *burns*, *33*(2), 139-148.

Aung, M. M., & Chang, Y. S. (2014). Temperature management for the quality assurance of a perishable food supply chain. *Food Control*, *40*, 198-207.

Babu, S., Claville, M. O., & Ghebreyessus, K. (2015). Rapid synthesis of highly stable silver nanoparticles and its application for colourimetric sensing of cysteine. *Journal of Experimental Nanoscience*, *10*(16), 1242-1255.

Baghizadeh, A., Ranjbar, S., Gupta, V. K., Asif, M., Pourseyedi, S., Karimi, M. J., & Mohammadinejad, R. (2015). Green synthesis of silver nanoparticles using seed extract of Calendula officinalis in liquid phase. *Journal of molecular liquids*, *207*, 159-163.

Baharara, J., Namvar, F., Ramezani, T., Mousavi, M., & Mohamad, R. (2015). Silver nanoparticles biosynthesized using Achillea biebersteinii flower extract: apoptosis induction in MCF-7 cells via caspase activation and regulation of Bax and Bcl-2 gene expression. *Molecules*, *20*(2), 2693-2706.

Baker, S., Mohan Kumar, K., Santosh, P., Rakshith, D., & Satish, S. (2015). Extracellular synthesis of silver nanoparticles by novel *Pseudomonas veronii*

AS41G inhabiting *Annona squamosa* L. and their bactericidal activity. *Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy, 136*, 1434-1440.

Balaji, D. S., Basavaraja, S., Deshpande, R., Mahesh, D. B., Prabhakar, B. K., & Venkataraman, A. (2009). Extracellular biosynthesis of functionalized silver nanoparticles by strains of *Cladosporium cladosporioides* fungus. *Colloids and Surfaces B: Biointerfaces, 68*(1), 88-92.

Bankar, A., Joshi, B., Kumar, A. R., & Zinjarde, S. (2010). Banana peel extract mediated novel route for the synthesis of silver nanoparticles. *Colloids and Surfaces A: Physicochemical and Engineering Aspects, 368*(1), 58-63.

Banu, A. N., Balasubramanian, C., & Moorthi, P. V. (2014). Biosynthesis of silver nanoparticles using *Bacillus thuringiensis* against dengue vector, *Aedes aegypti* (Diptera: Culicidae). *Parasitology research, 113*(1), 311-316.

Barelds, H. P. (2010). *The uptake and effects on survival of nano silver and nano titanium dioxide in brine shrimp (Artemia nauplii).* (Doctoral), Utrecht University Repository.

Baron, S. (1996). *Epidemiology--Medical Microbiology*: University of Texas Medical Branch at Galveston.

Baruwati, B., Polshettiwar, V., & Varma, R. S. (2009). Glutathione promoted expeditious green synthesis of silver nanoparticles in water using microwaves. *Green Chemistry, 11*(7), 926-930.

Bauer, A. W., Kirby, W. M., Sherris, J. C., & Turck, M. (1966). Antibiotic susceptibility testing by a standardized single disk method. *Am J Clin Pathol, 45*(4), 493-496.

Becaro, A. A., Puti, F. C., Panosso, A. R., Gern, J. C., Brandão, H. M., Correa, D. S., & Ferreira, M. D. (2016). Postharvest quality of fresh-cut carrots packaged in plastic films containing silver nanoparticles. *Food and bioprocess technology, 9*(4), 637-649.

Begum, N. A., Mondal, S., Basu, S., Laskar, R. A., & Mandal, D. (2009). Biogenic synthesis of Au and Ag nanoparticles using aqueous solutions of Black Tea leaf extracts. *Colloids and Surfaces B: Biointerfaces, 71*(1), 113-118.

Beumer, R., & Kusumaningrum, H. (2003). Kitchen hygiene in daily life. *International biodeterioration & biodegradation, 51*(4), 299-302.

Bharani, M., Karpagam, T., Varalakshmi, B., Gayathiri, G., & Priya, K. L. (2012). Synthesis and characterization of silver nanoparticles from *Wrightia tinctoria*. *International Journal of Applied Biology and Pharmaceutical Technology, 3*(1), 58-63.

Bloomfield, S. F. (2003). Home hygiene: a risk approach. *International journal of hygiene and environmental health, 206*(1), 1-8.

Bogle, K., Dhole, S., & Bhoraskar, V. (2006). Silver nanoparticles: synthesis and size control by electron irradiation. *Nanotechnology, 17*(13), 3204-3208.

Bolotova, Y. V., Lou, J., & Safro, I. (2017). Detecting and monitoring foodborne illness outbreaks: Twitter communications and the 2015 US *Salmonella* outbreak linked to imported cucumbers. *arXiv preprint arXiv:1708.07534*.

Braden, C., & Tauxe, R. (2006). Surveillance for emerging pathogens in the United States *Emerging Foodborne Pathogens* (pp. 23-49). Cambridge, England: Woodhead Publishing Limited.

Brayner, R., Barberousse, H., Hemadi, M., Djedjat, C., Yéprémian, C., Coradin, T., Livage, J., Fiévet, F., & Couté, A. (2007). Cyanobacteria as bioreactors for the synthesis of Au, Ag, Pd, and Pt nanoparticles via an enzyme-mediated route. *J Nanosci Nanotechnol, 7*(8), 2696-2708.

Briley, R. T., Teel, J. H., & Fowler, J. P. (2001). Nontypical *Bacillus cereus* outbreak in a child care center. *Journal of environmental health, 63*(7), 9-11.

Brown, S., Santa Maria Jr, J. P., & Walker, S. (2013). Wall teichoic acids of Gram-positive bacteria. *Annual review of microbiology, 67*, 313-336.

Bruneau, A., Turcotte, P., Pilote, M., Gagné, F., & Gagnon, C. (2016). Fate of silver nanoparticles in wastewater and immunotoxic effects on rainbow trout. *Aquatic Toxicology, 174*, 70-81.

Bumbudsanpharoke, N., & Ko, S. (2015). Nano‐Food Packaging: An Overview of Market, Migration Research, and Safety Regulations. *Journal of food science, 80*(5), 910-923.

Burt, S. (2004). Essential oils: their antibacterial properties and potential applications in foods—a review. *Int J Food Microbiol, 94*(3), 223-253.

Carpentier, B. (1997). Sanitary quality of meat chopping board surfaces: a bibliographical study. *Food Microbiology, 14*(1), 31-37.

Castro, A., Santos, C., Meireles, H., Silva, J., & Teixeira, P. (2016). Food handlers as potential sources of dissemination of virulent strains of Staphylococcus aureus in the community. *Journal of Infection and Public Health, 9*(2), 153-160.

Cataldo, F. (2014). Green synthesis of silver nanoparticles by the action of black or green tea infusions on silver ions. *European Chemical Bulletin, 3*(3), 280-289.

CDC. (2012). Multistate outbreak of listeriosis linked to whole cantaloupes from Jensen Farms, Colorado. Retrieved October 18, 2017, from Centers for Disease Control and Prevention http://www.cdc.gov/listeria/outbreaks/cantaloupes-jensen-farms/index.html

CDC. (2016). Estimates of Foodborne Illness in the United States: Burden of Foodborne Illness. Retrieved November 22, 2017, from Centers for Disease Control and Prevention https://www.cdc.gov/foodborneburden/2011-foodborne-estimates.html

Chanda, S. (2014). Silver nanoparticles (medicinal plants mediated): a new generation of antimicrobials to combat microbial pathogens–a review. *Microbial Pathogens and Strategies for Combating Them: Science Technology and Education. FORMATEX Research Center, Badajoz, Spain*, 1314-1323.

Charnock, C. (2003). Antibacterial efficacy of Norwegian hand dishwashing detergents. *Food protection trends, 23*(10), 790-796.

Chaudhry, Q., Scotter, M., Blackburn, J., Ross, B., Boxall, A., Castle, L., Aitken, R., & Watkins, R. (2008). Applications and implications of nanotechnologies for the food sector. *Food additives and contaminants, 25*(3), 241-258.

Chen, S.-F., & Zhang, H. (2012). Aggregation kinetics of nanosilver in different water conditions. *Advances in Natural Sciences: Nanoscience and Nanotechnology, 3*(3), 035006-035009.

Chen, X., & Schluesener, H. (2008). Nanosilver: a nanoproduct in medical application. *Toxicology letters, 176*(1), 1-12.

Chen, Y., Burall, L. S., Macarisin, D., Pouillot, R., Strain, E., De Jesus, A. J., Laasri, A., Wang, H., Ali, L., & Tatavarthy, A. (2016). Prevalence and level of *Listeria monocytogenes* in ice cream linked to a listeriosis outbreak in the United States. *Journal of Food Protection, 79*(11), 1828-1832.

Chopra, I. (2007). The increasing use of silver-based products as antimicrobial agents: a useful development or a cause for concern? *Journal of antimicrobial Chemotherapy, 59*(4), 587-590.

Chukwu, E. E., Nwaokorie, F. O., Coker, A. O., Avila-Campos, M. J., Solis, R. L., Llanco, L. A., & Ogunsola, F. T. (2016). Detection of toxigenic *Clostridium perfringens* and *Clostridium botulinum* from food sold in Lagos, Nigeria. *Anaerobe, 42*, 176-181.

Clarkson, C., Maharaj, V. J., Crouch, N. R., Grace, O. M., Pillay, P., Matsabisa, M. G., Bhagwandin, N., Smith, P. J., & Folb, P. I. (2004). *In vitro* antiplasmodial activity of medicinal plants native to or naturalised in South Africa. *Journal of ethnopharmacology, 92*(2), 177-191.

Cliver, D. O. (2006). Cutting boards in *Salmonella* cross-contamination. *Journal of AOAC International, 89*(2), 538-542.

CLSI. (2012). Performance Standards for Antimicrobial Susceptibility Testing; Twenty-Second Informational Supplement (Vol. 32). USA: The Clinical and Laboratory Standards Institute.

Costa Silva, L. P., Oliveira, J. P., Keijok, W. J., da Silva, A. R., Aguiar, A. R., Guimarães, M. C. C., Ferraz, C. M., Araújo, J. V., Tobias, F. L., & Braga, F. R. (2017). Extracellular biosynthesis of silver nanoparticles using the cell-free filtrate of nematophagous fungus *Duddingtonia flagrans*. *Int J Nanomedicine, 12*, 6373-6381.

Crago, B., Ferrato, C., Drews, S., Svenson, L., Tyrrell, G., & Louie, M. (2012). Prevalence of *Staphylococcus aureus* and methicillin-resistant *S. aureus* (MRSA) in food samples associated with foodborne illness in Alberta, Canada from 2007 to 2010. *Food Microbiology*, *32*(1), 202-205.

Croxen, M. A., Law, R. J., Scholz, R., Keeney, K. M., Wlodarska, M., & Finlay, B. B. (2013). Recent advances in understanding enteric pathogenic *Escherichia coli*. *Clinical microbiology reviews*, *26*(4), 822-880.

D'Ostuni, V., Tristezza, M., De Giorgi, M. G., Rampino, P., Grieco, F., & Perrotta, C. (2016). Occurrence of *Listeria monocytogenes* and *Salmonella* spp. in meat processed products from industrial plants in Southern Italy. *Food Control*, *62*, 104-109.

Dakal, T. C., Kumar, A., Majumdar, R. S., & Yadav, V. (2016). Mechanistic basis of antimicrobial actions of silver nanoparticles. *Frontiers in microbiology*, *7*, 1831-1847.

Dang, T. M. D., Le, T. T. T., Fribourg-Blanc, E., & Dang, M. C. (2012). Influence of surfactant on the preparation of silver nanoparticles by polyol method. *Advances in Natural Sciences: Nanoscience and Nanotechnology*, *3*(3), 035004-035007.

Danilczuk, M., Lund, A., Sadlo, J., Yamada, H., & Michalik, J. (2006). Conduction electron spin resonance of small silver particles. *Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy*, *63*(1), 189-191.

Das, P. R., Prava, S., Rudra, D., Nanda, M., Dash, H., & Nanda, P. (2011). Spectral, thermal, morphological and mechanical properties of soy-protein isolate modified with urea. *International Journal of Research in Pharmacy and Chemistry*, *1*(4), 754-764.

Das, V. L., Thomas, R., Varghese, R. T., Soniya, E. V., Mathew, J., & Radhakrishnan, E. K. (2014). Extracellular synthesis of silver nanoparticles by the *Bacillus* strain CS 11 isolated from industrialized area. *3 Biotech*, *4*(2), 121-126.

De Jesús, A. J., Olsen, A. R., Bryce, J. R., & Whiting, R. C. (2004). Quantitative contamination and transfer of *Escherichia coli* from foods by houseflies, *Musca domestica* L.(Diptera: Muscidae). *International Journal of Food Microbiology*, *93*(2), 259-262.

De Neeling, A., Van den Broek, M., Spalburg, E., van Santen-Verheuvel, M., Dam-Deisz, W., Boshuizen, H., Van De Giessen, A., Van Duijkeren, E., & Huijsdens, X. (2007). High prevalence of methicillin resistant *Staphylococcus aureus* in pigs. *Veterinary microbiology*, *122*(3), 366-372.

Devanesan, S., AlSalhi, M. S., Vishnubalaji, R., Alfuraydi, A. A., Alajez, N. M., Alfayez, M., Murugan, K., Sayed, S. R., Nicoletti, M., & Benelli, G. (2017). Rapid biological synthesis of silver nanoparticles using plant seed extracts and their cytotoxicity on colorectal cancer cell lines. *Journal of Cluster Science*, *28*(1), 595-605.

Devi, L. S., & Joshi, S. (2015). Ultrastructures of silver nanoparticles biosynthesized using endophytic fungi. *Journal of Microscopy and Ultrastructure*, *3*(1), 29-37.

Dhand, V., Soumya, L., Bharadwaj, S., Chakra, S., Bhatt, D., & Sreedhar, B. (2016). Green synthesis of silver nanoparticles using *Coffea arabica* seed extract and its antibacterial activity. *Mater. Sci. Eng. C.*, *58*, 36-43.

Dierick, K., Van Coillie, E., Swiecicka, I., Meyfroidt, G., Devlieger, H., Meulemans, A., Hoedemaekers, G., Fourie, L., Heyndrickx, M., & Mahillon, J. (2005). Fatal family outbreak of *Bacillus cereus*-associated food poisoning. *Journal of clinical microbiology*, *43*(8), 4277-4279.

Digest, M. (2017). 130 school children affected by food poisoning in 1 month, is food safety standards lacking? Retrieved November 24, 2017 http://malaysiandigest.com/frontpage/282-main-tile/664828-130-school-children-affected-by-food-poisoning-in-1-month-is-food-safety-standards-lacking.html

Dimkpa, C. O., Calder, A., Gajjar, P., Merugu, S., Huang, W., Britt, D. W., McLean, J. E., Johnson, W. P., & Anderson, A. J. (2011). Interaction of silver nanoparticles with an environmentally beneficial bacterium, *Pseudomonas chlororaphis*. *Journal of hazardous materials*, *188*(1), 428-435.

Do Carmo, L. S., Cummings, C., Roberto Linardi, V., Souza Dias, R., Maria De Souza, J., De Sena, M. J., Aparecida Dos Santos, D., Shupp, J. W., Karla Peres Pereira, R., & Jett, M. (2004). A case study of a massive staphylococcal food poisoning incident. *Foodbourne Pathogens and Disease*, *1*(4), 241-246.

Duc, L. H., Dong, T. C., Logan, N. A., Sutherland, A. D., Taylor, J., & Cutting, S. M. (2005). Cases of emesis associated with bacterial contamination of an infant breakfast cereal product. *International Journal of Food Microbiology*, *102*(2), 245-251.

Durán, N., Marcato, P. D., Conti, R. D., Alves, O. L., Costa, F., & Brocchi, M. (2010). Potential use of silver nanoparticles on pathogenic bacteria, their toxicity and possible mechanisms of action. *Journal of the Brazilian Chemical Society*, *21*(6), 949-959.

Duygu, D. Y., Udoh, A. U., Ozer, T. B., Akbulut, A., Erkaya, I. A., Yildiz, K., & Guler, D. (2012). Fourier transform infrared (FTIR) spectroscopy for identification of Chlorella vulgaris Beijerinck 1890 and Scenedesmus obliquus (Turpin) Kützing 1833. *African Journal of Biotechnology*, *11*(16), 3817-3824.

Elbeshehy, E. K., Elazzazy, A. M., & Aggelis, G. (2015). Silver nanoparticles synthesis mediated by new isolates of *Bacillus* spp., nanoparticle characterization and their activity against Bean Yellow Mosaic Virus and human pathogens. *Frontiers in microbiology*, *6*, 453-465.

Elmahdi, S., DaSilva, L. V., & Parveen, S. (2016). Antibiotic resistance of Vibrio parahaemolyticus and Vibrio vulnificus in various countries: A review. *Food Microbiology, 57*, 128-134.

Embun, M. (2013). 'Ayam masak merah' contaminated. https://www.thestar.com.my/news/nation/2013/10/02/ayam-masak-merah-contaminated-cook-who-made-the-dish-is-in-shock-say-relatives/

Erickson, M. C., Liao, J., Cannon, J. L., & Ortega, Y. R. (2015). Contamination of knives and graters by bacterial foodborne pathogens during slicing and grating of produce. *Food Microbiology, 52*, 138-145.

F Gonçalves, S., D Pavlaki, M., Lopes, R., Hammes, J., Gallego‐Urrea, J. A., Hassellöv, M., Jurkschat, K., Crossley, A., & Loureiro, S. (2017). Effects of silver nanoparticles on the freshwater snail *Physa acuta*: The role of test media and snails' life cycle stage. *Environmental toxicology and chemistry, 36*(1), 243-253.

Falomir, M. P., Rico, H., & Gozalbo, D. (2013). Enterobacter and *Klebsiella* species isolated from fresh vegetables marketed in Valencia (Spain) and their clinically relevant resistances to chemotherapeutic agents. *Foodborne Pathog Dis, 10*(12), 1002-1007.

Fang, H., Zhang, X., Zhang, S. J., Liu, L., Zhao, Y. M., & Xu, H. J. (2015). Ultrasensitive and quantitative detection of paraquat on fruits skins via surface-enhanced Raman spectroscopy. *Sensors and Actuators B: Chemical, 213*, 452-456.

Faour-Klingbeil, D., Kuri, V., & Todd, E. (2016). The transfer rate of *Salmonella* Typhimurium from contaminated parsley to other consecutively chopped batches via cutting boards under different food handling scenarios. *Food Research International, 89*, 495-503.

Fayaz, A. M., Balaji, K., Girilal, M., Yadav, R., Kalaichelvan, P. T., & Venketesan, R. (2010). Biogenic synthesis of silver nanoparticles and their synergistic effect with antibiotics: a study against Gram-positive and Gram-negative bacteria. *Nanomedicine: Nanotechnology, Biology and Medicine, 6*(1), 103-109.

Ferreira, V., Wiedmann, M., Teixeira, P., & Stasiewicz, M. (2014). *Listeria monocytogenes* persistence in food-associated environments: epidemiology, strain characteristics, and implications for public health. *J Food Prot, 77*(1), 150-170.

Finney, D. (1949). The adjustment for a natural response rate in probit analysis. *Annals of Applied Biology, 36*(2), 187-195.

Finney, D. J., & Tattersfield, F. (1952). *Probit analysis* (2nd edition ed.): Cambridge University Press; Cambridge.

Firdhouse, M. J., & Lalitha, P. (2012). Green synthesis of silver nanoparticles using the aqueous extract of *Portulaca oleracea* (L.). *Asian Journal of Pharmaceutical and Clinical Research, 6*(1), 92-94.

Firdhouse, M. J., & Lalitha, P. (2015). Biosynthesis of Silver Nanoparticles and Its Applications. *Journal of Nanotechnology, 2015*, 18-35.

Fitz-James, I., Botteldoorn, N., & Dierick, C. (2008). Joined investigation of a large outbreak involving *Staphylococcus aureus*. *Proceeding FoodMicro*.

Flint, J. A., Van Duynhoven, Y. T., Angulo, F. J., DeLong, S. M., Braun, P., Kirk, M., Scallan, E., Fitzgerald, M., Adak, G. K., & Sockett, P. (2005). Estimating the burden of acute gastroenteritis, foodborne disease, and pathogens commonly transmitted by food: an international review. *Clinical infectious diseases*, *41*(5), 698-704.

Franci, G., Falanga, A., Galdiero, S., Palomba, L., Rai, M., Morelli, G., & Galdiero, M. (2015). Silver nanoparticles as potential antibacterial agents. *Molecules*, *20*(5), 8856-8874.

Fröhlich, E. E., & Fröhlich, E. (2016). Cytotoxicity of nanoparticles contained in food on intestinal cells and the gut microbiota. *International Journal of Molecular Sciences*, *17*(4), 509-530.

From, C., Pukall, R., Schumann, P., Hormazábal, V., & Granum, P. E. (2005). Toxin-producing ability among *Bacillus* spp. outside the *Bacillus cereus* group. *Applied and environmental microbiology*, *71*(3), 1178-1183.

FSN. (2014). 158 Students in Malaysia Sickened By Foodborne Illness. Retrieved Oct 2017, from Food Safety News https://www.foodsafetynews.com/2014/02/158-students-in-malaysia-sick-with-food-poisoning/#.V2yng_l97Dc

Fuentes, S. (2015). CAP calls for goverment action on food poisoning. Retrieved November 24, 2017 http://www.freemalaysiatoday.com/category/nation/2015/04/07/cap-calls-for-govt-action-on-food-poisoning/

Gade, A., Bonde, P., Ingle, A., Marcato, P., Duran, N., & Rai, M. (2008). Exploitation of *Aspergillus niger* for synthesis of silver nanoparticles. *Journal of Biobased Materials and Bioenergy*, *2*(3), 243-247.

Gaillet, S., & Rouanet, J.-M. (2015). Silver nanoparticles: their potential toxic effects after oral exposure and underlying mechanisms–a review. *Food and Chemical Toxicology*, *77*, 58-63.

Garcia-Reyero, N., Thornton, C., Hawkins, A. D., Escalon, L., Kennedy, A. J., Steevens, J. A., & Willett, K. L. (2015). Assessing the exposure to nanosilver and silver nitrate on fathead minnow gill gene expression and mucus production. *Environmental Nanotechnology, Monitoring & Management*, *4*, 58-66.

Gardea-Torresdey, J. L., Gomez, E., Peralta-Videa, J. R., Parsons, J. G., Troiani, H., & Jose-Yacaman, M. (2003). Alfalfa sprouts: a natural source for the synthesis of silver nanoparticles. *Langmuir*, *19*(4), 1357-1361.

Garg, S., Chandra, A., Mazumder, A., & Mazumder, R. (2014). Green synthesis of silver nanoparticles using Arnebia nobilis root extract and wound healing potential of its hydrogel. *Asian Journal of Pharmaceutics (AJP), 8*(2), 95-101.

Gasparyan, V. K., & Bazukyan, I. L. (2013). Lectin sensitized anisotropic silver nanoparticles for detection of some bacteria. *Analytica chimica acta, 766*, 83-87.

Gholami-Shabani, M. H., Akbarzadeh, A., Mortazavi, M., & Emadzadeh, M.-K. (2013). Evaluation of the antibacterial properties of silver nanoparticles synthesized with *Fusarium oxysporum* and *Escherichia coli*. *International Journal of Life Science and Pharma Research, 2*(1), 342-348.

Ghorbani, H. R. (2013). Biosynthesis of silver nanoparticles using *Salmonella* Typhirium. *Journal of Nanostructure in Chemistry, 3*(1), 29-32.

Giraffa, G. (2003). Functionality of enterococci in dairy products. *International Journal of Food Microbiology*, *88*(2), 215-222.

Gogoi, S. (2013). Green synthesis of silver nanoparticles from leaves extract of ethnomedicinal plants-*Pogostemon benghalensis* (B) O. Ktz. *Advance in Science and Research, 4*, 274-278.

Goh, S. G., Leili, A.-H., Kuan, C. H., Loo, Y. Y., Lye, Y. L., San Chang, W., Soopna, P., Najwa, M. S., Tang, J. Y. H., & Yaya, R. (2014). Transmission of *Listeria monocytogenes* from raw chicken meat to cooked chicken meat through cutting boards. *Food Control, 37*, 51-55.

Golubeva, O. Y., Shamova, O., Orlov, D., Pazina, T. Y., Boldina, A., & Kokryakov, V. (2010). Study of antimicrobial and hemolytic activities of silver nanoparticles prepared by chemical reduction. *Glass Physics and Chemistry, 36*(5), 628-634.

Gonzales, M., Mitsumori, L. M., Kushleika, J. V., Rosenfeld, M. E., & Krishnan, K. M. (2010). Cytotoxicity of iron oxide nanoparticles made from the thermal decomposition of organometallics and aqueous phase transfer with Pluronic F127. *Contrast media & molecular imaging, 5*(5), 286-293.

Govindarajan, M., Rajeswary, M., Muthukumaran, U., Hoti, S., Khater, H. F., & Benelli, G. (2016). Single-step biosynthesis and characterization of silver nanoparticles using *Zornia diphylla* leaves: a potent eco-friendly tool against malaria and arbovirus vectors. *Journal of Photochemistry and Photobiology B: Biology, 161*, 482-489.

Groh, K. J., Dalkvist, T., Piccapietra, F., Behra, R., Suter, M. J.-F., & Schirmer, K. (2015). Critical influence of chloride ions on silver ion-mediated acute toxicity of silver nanoparticles to zebrafish embryos. *Nanotoxicology, 9*(1), 81-91.

Guo, Y., Zhou, H., Qin, L., Pang, Z., Qin, T., Ren, H., Pan, Z., & Zhou, J. (2016). Frequency, antimicrobial resistance and genetic diversity of *Klebsiella pneumoniae* in food samples. *PLoS One, 11*(4), e0153561.

Gyles, C. (2007). Shiga toxin-producing An overview. *Journal of animal science, 85*(13_suppl), E45-E62.

Hamidi, M., Jovanova, B., & Panovska, T. (2014). Toxicological evaluation of the plant products using brine shrimp (*Artemia salina* L.) model. *Macedonian Pharm Bull, 60*(1), 9-18.

Harada, M., Kawasaki, C., Saijo, K., Demizu, M., & Kimura, Y. (2010). Photochemical synthesis of silver particles using water-in-ionic liquid microemulsions in high-pressure CO 2. *Journal of Colloid and Interface Science, 343*(2), 537-545.

Hartland, E. L., & Leong, J. M. (2013). Enteropathogenic and enterohemorrhagic *E. coli*: ecology, pathogenesis, and evolution. *Frontiers in cellular and infection microbiology, 3*, 15-17.

Haysom, I. W., & Sharp, A. K. (2005). Bacterial contamination of domestic kitchens over a 24-hour period. *British Food Journal, 107*(7), 453 - 466.

Heiman, K. E., Mody, R. K., Johnson, S. D., Griffin, P. M., & Gould, L. H. (2015). *Escherichia coli* O157 outbreaks in the United States, 2003–2012. *Emerg. Infect. Dis, 21*(8), 1293-1301.

Hemath Naveen, K., Kumar, G., Karthik, L., & Bhaskara Rao, K. (2010). Extracellular biosynthesis of silver nanoparticles using the filamentous fungus *Penicillium* sp. *Archives of Applied Science Research, 2*(6), 161-167.

Hendrickson, O. D., Klochkov, S. G., Novikova, O. V., Bravova, I. M., Shevtsova, E. F., Safenkova, I. V., Zherdev, A. V., Bachurin, S. O., & Dzantiev, B. B. (2016). Toxicity of nanosilver in intragastric studies: biodistribution and metabolic effects. *Toxicology letters, 241*, 184-192.

Hennekinne, J.-A., De Buyser, M.-L., & Dragacci, S. (2012). *Staphylococcus aureus* and its food poisoning toxins: characterization and outbreak investigation. *FEMS microbiology reviews, 36*(4), 815-836.

Hettiarachchi, M., & Wickramarachchi, P. (2011). Synthesis of chitosan stabilized silver nanoparticles using gamma ray irradiation and characterization. *Journal of Science, University of Kelaniya, 6*, 65-75.

Holah, J., & Hall, K. (2006). The effect of an antibacterial washing‐up liquid in reducing dishwater aerobic plate counts. *Letters in applied microbiology, 42*(5), 532-537.

Huang, H., & Yang, Y. (2008). Preparation of silver nanoparticles in inorganic clay suspensions. *Composites Science and Technology, 68*(14), 2948-2953.

Huang, J., Li, Q., Sun, D., Lu, Y., Su, Y., Yang, X., Wang, H., Wang, Y., Shao, W., & He, N. (2007). Biosynthesis of silver and gold nanoparticles by novel sundried *Cinnamomum camphora* leaf. *Nanotechnology, 18*(10), 105104-105115.

Hulkoti, N. I., & Taranath, T. C. (2014). Biosynthesis of nanoparticles using microbes—A review. *Colloids and Surfaces B: Biointerfaces, 121*, 474-483.

Huusko, S., Pihlajasaari, A., Salmenlinna, S., SÕGel, J., DontŠEnko, I., De Pinna, E., LundstrÖM, H., Toikkanen, S., & Rimhanen-Finne, R. (2017). Outbreak of *Salmonella enteritidis* phage type 1B associated with frozen pre-cooked chicken cubes, Finland 2012. *Epidemiology and Infection, 145*(13), 2727-2734.

Ichikawa, K., Gakumazawa, M., Inaba, A., Shiga, K., Takeshita, S., Mori, M., & Kikuchi, N. (2010). Acute encephalopathy of *Bacillus cereus* mimicking Reye syndrome. *Brain and Development, 32*(8), 688-690.

Ingle, A., Rai, M., Gade, A., & Bawaskar, M. (2009). *Fusarium solani*: a novel biological agent for the extracellular synthesis of silver nanoparticles. *Journal of Nanoparticle Research, 11*(8), 2079-2085.

Irlbeck, E. G., Akers, C., & Palmer, A. (2011). A nutty study: A framing analysis of the 2009 *Salmonella* outbreak in peanut products. *Journal of Applied Communications, 95*(2), 48-59.

Ismail, A.-W. A., Sidkey, N. M., Arafa, R. A., Fathy, R. M., & El-Batal, A. I. (2016). Evaluation of *In vitro* antifungal activity of silver and selenium nanoparticles against *Alternaria solani* caused Early Blight Disease on potato. *British Biotechnology Journal, 12*(3), 1-11.

Isshiki, K., Bari, M., Kawamoto, S., & Shiina, T. (2009). Regulatory issues in Japan regarding produce safety. In Sapers, G. M., Solomon, E., andMatthews, K. R. E. (Eds.), *The Produce Contamination Problem: Causes and Solutions* (pp. 353-389).

Jackson, B. R., Salter, M., Tarr, C., Conrad, A., Harvey, E., Steinbock, L., Saupe, A., Sorenson, A., Katz, L., & Stroika, S. (2015). Notes from the field: listeriosis associated with stone fruit—United States, 2014. *MMWR Morbility and Mortality Weekly Report, 64*(10), 282-283.

Jackson, K., Biggerstaff, M., Tobin-D'Angelo, M., Sweat, D., Klos, R., Nosari, J., Garrison, O., Boothe, E., Saathoff-Huber, L., & Hainstock, L. (2011). Multistate outbreak of *Listeria monocytogenes* associated with Mexican-style cheese made from pasteurized milk among pregnant, Hispanic women. *Journal of Food Protection, 74*(6), 949-953.

Jain, N., Bhargava, A., Majumdar, S., Tarafdar, J., & Panwar, J. (2011). Extracellular biosynthesis and characterization of silver nanoparticles using *Aspergillus flavus* NJP08: a mechanism perspective. *Nanoscale, 3*(2), 635-641.

Jeewon, R., Nouvishika, S., Kumar, D. S., & Jheelan-Ramchandur, A. (2017). An investigation into how far do residents adopt measures to reduce microbial hazards during food handling. *Current Research in Nutrition and Food Science Journal, 5*(1), 06-14.

Jensen, D. A., Danyluk, M. D., Harris, L. J., & Schaffner, D. W. (2017). Quantifying bacterial cross-contamination rates between fresh-cut produce and hands. *Journal of Food Protection, 80*(2), 213-219.

Jo, J. H., Singh, P., Kim, Y. J., Wang, C., Mathiyalagan, R., Jin, C.-G., & Yang, D. C. (2016). *Pseudomonas deceptionensis* DC5-mediated synthesis of extracellular silver nanoparticles. *Artificial Cells, Nanomedicine, and Biotechnology, 44*(6), 1576-1581.

Johler, S., Tichaczek-Dischinger, P. S., Rau, J., Sihto, H.-M., Lehner, A., Adam, M., & Stephan, R. (2013). Outbreak of Staphylococcal food poisoning due to SEA-producing *Staphylococcus aureus*. *Foodborne Pathog Dis, 10*(9), 777-781.

Jung, W. K., Koo, H. C., Kim, K. W., Shin, S., Kim, S. H., & Park, Y. H. (2008). Antibacterial activity and mechanism of action of the silver ion in *Staphylococcus aureus* and *Escherichia coli*. *Applied and environmental microbiology, 74*(7), 2171-2178.

Kaakoush, N. O., Castaño-Rodríguez, N., Mitchell, H. M., & Man, S. M. (2015). Global epidemiology of *Campylobacter* infection. *Clin. Microbiol. Rev., 28*(3), 687-720.

Kaja, S., Payne, A. J., Singh, T., Ghuman, J. K., Sieck, E. G., & Koulen, P. (2015). An optimized lactate dehydrogenase release assay for screening of drug candidates in neuroscience. *Journal of pharmacological and toxicological methods, 73*, 1-6.

Kalishwaralal, K., Deepak, V., Pandian, S. R. K., Kottaisamy, M., BarathManiKanth, S., Kartikeyan, B., & Gurunathan, S. (2010). Biosynthesis of silver and gold nanoparticles using *Brevibacterium casei*. *Colloids and Surfaces B: Biointerfaces, 77*(2), 257-262.

Kalpana, D., & Lee, Y. S. (2013). Synthesis and characterization of bactericidal silver nanoparticles using cultural filtrate of simulated microgravity grown *Klebsiella pneumoniae*. *Enzyme and microbial technology, 52*(3), 151-156.

Kamga, G. W., Burckhardt, F., Frank, C., Hiller, P., Wichmann-Schauer, H., Zuschneid, I., Hentschke, J., Hitzbleck, T., Contzen, M., & Suckau, M. (2011). The proof of the pudding is in the eating: an outbreak of emetic syndrome after a kindergarten excursion, Berlin, Germany, December 2007. *Euro surveillance: bulletin Europeen sur les maladies transmissibles= European communicable disease bulletin, 16*(15), 169-178.

Kanwar, A. S. (2007). Brine shrimp (*Artemia salina*) a marine animal for simple and rapid biological assays. *Journal of Chinese Clinical Medicine, 2*(4), 236-240.

Karthik, C., & Radha, K. (2012). Biosynthesis and characterization of silver nanoparticles using *Enterobacter aerogenes*: a kinetic approach. *Digest Journal of Nanomaterials and Biostructures, 7*, 1007-1014.

Kaviya, S., Santhanalakshmi, J., Viswanathan, B., Muthumary, J., & Srinivasan, K. (2011). Biosynthesis of silver nanoparticles using *Citrus sinensis* peel extract and its antibacterial activity. *Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy, 79*(3), 594-598.

Kelly, K. L., Coronado, E., Zhao, L. L., & Schatz, G. C. (2003). The optical properties of metal nanoparticles: the influence of size, shape, and dielectric environment. *Journal of Physical Chemistry, 107*(3), 668-677.

Khalaf, N. A., Shakya, A. K., Al-Othman, A., El-Agbar, Z., & Farah, H. (2008). Antioxidant activity of some common plants. *Turkish Journal of Biology, 32*(1), 51-55.

Khalifa, R. A., Nasser, M. S., Gomaa, A. A., Osman, N. M., & Salem, H. M. (2013). Resazurin Microtiter Assay Plate method for detection of susceptibility of multidrug resistant *Mycobacterium tuberculosis* to second-line anti-tuberculous drugs. *Egypt J Chest Dis Tuberc, 62*(2), 241-247.

Khalil, M. M., Ismail, E. H., El-Baghdady, K. Z., & Mohamed, D. (2014). Green synthesis of silver nanoparticles using olive leaf extract and its antibacterial activity. *Arabian Journal of Chemistry, 7*(6), 1131-1139.

Khan, N., & Mukhtar, H. (2007). Tea polyphenols for health promotion. *Life sciences, 81*(7), 519-533.

Kharissova, O. V., Dias, H. R., Kharisov, B. I., Pérez, B. O., & Pérez, V. M. J. (2013). The greener synthesis of nanoparticles. *Trends in biotechnology, 31*(4), 240-248.

Kim, H., Chon, J., Kim, Y., Kim, D., Kim, M., & Seo, K. (2015). Prevalence and characterization of extended-spectrum-β-lactamase-producing *Escherichia coli* and *Klebsiella pneumoniae* in ready-to-eat vegetables. *International Journal of Food Microbiology, 207*, 83-86.

Kim, J. S., Kuk, E., Yu, K. N., Kim, J.-H., Park, S. J., Lee, H. J., Kim, S. H., Park, Y. K., Park, Y. H., & Hwang, C.-Y. (2007). Antimicrobial effects of silver nanoparticles. *Nanomedicine: Nanotechnology, Biology and Medicine, 3*(1), 95-101.

Kim, J. S., Kuk, E., Yu, K. N., Kim, J.-H., Park, S. J., Lee, H. J., Kim, S. H., Park, Y. K., Park, Y. H., & Hwang, C.-Y. (2014). Corrigendum to "Antimicrobial effects of silver nanoparticles"[Nanomed Nanotechnol Biol Med. 2007; 1: 95-101]. *Nanomedicine: Nanotechnology, Biology and Medicine, 10*(5), e1119.

Kim, K.-J., Sung, W. S., Suh, B. K., Moon, S.-K., Choi, J.-S., Kim, J. G., & Lee, D. G. (2009). Antifungal activity and mode of action of silver nano-particles on *Candida albicans*. *Biometals, 22*(2), 235-242.

Kim, Y. S., Kim, J. S., Cho, H. S., Rha, D. S., Kim, J. M., Park, J. D., Choi, B. S., Lim, R., Chang, H. K., & Chung, Y. H. (2008). Twenty-eight-day oral toxicity, genotoxicity, and gender-related tissue distribution of silver nanoparticles in Sprague-Dawley rats. *Inhalation toxicology, 20*(6), 575-583.

King, L., Loukiadis, E., Mariani‐Kurkdjian, P., Haeghebaert, S., Weill, F. X., Baliere, C., Ganet, S., Gouali, M., Vaillant, V., & Pihier, N. (2014). Foodborne transmission of sorbitol‐fermenting *Escherichia coli* O157:H7 via ground beef: an outbreak in northern France, 2011. *Clinical Microbiology and Infection, 20*(12), 1136-1144.

Kirk, R. E., & Othmer, D. F. (1980). Encyclopedia of Chemical Technology (Vol. 22, pp. 628-648). New York: John Wiley & Sons, Inc.

Kirthi, A. V., Rahuman, A. A., Jayaseelan, C., Karthik, L., Marimuthu, S., Santhoshkumar, T., Venkatesan, J., Kim, S.-K., Kumar, G., & Kumar, S. R. S. (2012). Novel approach to synthesis silver nanoparticles using plant pathogenic fungi, *Puccinia graminis*. *Materials Letters, 81*, 69-72.

Kitamoto, M., Kito, K., Niimi, Y., Shoda, S., Takamura, A., Hiramatsu, T., Akashi, T., Yokoi, Y., Hirano, H., & Hosokawa, M. (2009). Food poisoning by *Staphylococcus aureus* at a university festival. *Japanese Journal of Infectious Diseases, 62*(3), 242-243.

Klaus, T., Joerger, R., Olsson, E., & Granqvist, C.-G. (1999). Silver-based crystalline nanoparticles, microbially fabricated. *Proceedings of the National Academy of Sciences, 96*(24), 13611-13614.

Kon, K., & Rai, M. (2013). Metallic nanoparticles: mechanism of antibacterial action and influencing factors. *Journal of Comparative Clinical Pathology Research, 2*(2), 160-174.

Koovapra, S., Bandyopadhyay, S., Das, G., Bhattacharyya, D., Banerjee, J., Mahanti, A., Samanta, I., Nanda, P., Kumar, A., & Mukherjee, R. (2016). Molecular signature of extended spectrum β-lactamase producing *Klebsiella pneumoniae* isolated from bovine milk in eastern and north-eastern India. *Infection, Genetics and Evolution, 44*, 395-402.

Kos, M., Kahru, A., Drobne, D., Singh, S., Kalčíková, G., Kühnel, D., Rohit, R., Gotvajn, A. Ž., & Jemec, A. (2016). A case study to optimise and validate the brine shrimp *Artemia franciscana* immobilisation assay with silver nanoparticles: The role of harmonisation. *Environmental Pollution, 213*, 173-183.

Kowalska-Góralska, M., Ława, P., & Senze, M. (2011). Impact of silver contained in the Nano silver preparation on the survival of brine shrimp (*Artemia salina* Leach 1819) larvae. *Ecological Chemistry and Engineering. A, 18*(3), 371-377.

Krishnakumar, S., Divakaran, S., Shankar, G. U., Williams, P., & Sasikumar, M. (2015). Extracellular biosynthesis of silver nanoparticles (Ag-NPs) using *Fusarium oxysporum* (MTCC-2480) and its antibacterial efficacy against Gram-negative human pathogens. *Journal of Chemical and Pharmaceutical Research, 7*, 62-67.

Krishnaraj, C., Jagan, E., Rajasekar, S., Selvakumar, P., Kalaichelvan, P., & Mohan, N. (2010). Synthesis of silver nanoparticles using Acalypha indica leaf

extracts and its antibacterial activity against water borne pathogens. *Colloids and Surfaces B: Biointerfaces, 76*(1), 50-56.

Kuan, C. H., Goh, S. G., Loo, Y. Y., Chang, W. S., Lye, Y. L., Puspanadan, S., Tang, J. Y. H., Nakaguchi, Y., Nishibuchi, M., & Mahyudin, N. A. (2013). Prevalence and quantification of *Listeria monocytogenes* in chicken offal at the retail level in Malaysia. *Poultry science, 92*(6), 1664-1669.

Kuan, C. H., Lim, L. W. K., Ting, T. W., Rukayadi, Y., Ahmad, S. H., Radzi, C. W. J. W. M., Thung, T. Y., Ramzi, O. B., San Chang, W., & Loo, Y. Y. (2017). Simulation of decontamination and transmission of *Escherichia coli* O157: H7, *Salmonella enteritidis*, and *Listeria monocytogenes* during handling of raw vegetables in domestic kitchens. *Food Control, 80*, 395-400.

Kuda, T., Koyanagi, T., Shibata, G., Takahashi, H., & Kimura, B. (2016). Effect of carrot residue on the desiccation and disinfectant resistances of food related pathogens adhered to a stainless steel surfaces. *LWT-Food Science and Technology, 74*, 251-254.

Kumar, P., Selvi, S. S., Praba, A. L., Selvaraj, M., Rani, L. M., Suganthi, P., Devi, B. S., & Govindaraju, M. (2012). Antibacterial activity and in-vitro cytotoxicity assay against brine shrimp using silver nanoparticles synthesized from *Sargassum ilicifolium*. *Digest Journal of Nanomaterials and Biostructures, 7*(4), 1447-1455.

Kusumaningrum, H., Van Putten, M., Rombouts, F., & Beumer, R. (2002). Effects of antibacterial dishwashing liquid on foodborne pathogens and competitive microorganisms in kitchen sponges. *Journal of Food Protection, 65*(1), 61-65.

Kusumaningrum, H. D., Riboldi, G., Hazeleger, W. C., & Beumer, R. R. (2003). Survival of foodborne pathogens on stainless steel surfaces and cross-contamination to foods. *International Journal of Food Microbiology, 85*(3), 227-236.

Lara, H. H., Ayala-Nuñez, N. V., Ixtepan-Turrent, L., & Rodriguez-Padilla, C. (2010). Mode of antiviral action of silver nanoparticles against HIV-1. *J Nanobiotechnology, 8*(1), 1-10.

Lara, H. H., Ayala-Núnez, N. V., Turrent, L. d. C. I., & Padilla, C. R. (2010). Bactericidal effect of silver nanoparticles against multidrug-resistant bacteria. *World J Microbiol Biotechnol, 26*(4), 615-621.

Latip, L. A., Balkis, A. K., Mohd, J., & Anwa, A. (2015). An outbreak of *Escherichia coli* food poisoning at Teluk Keke, Malaysia 2012. *Medical Journal of Malaysia, 70*(1), 37-45.

Lau, C. P., Abdul-Wahab, M. F., Jaafar, J., Chan, G. F., & Abdul Rashid, N. A. (2015). Toxic effect of high concentration of sonochemically synthesized polyvinylpyrrolidone-coated silver nanoparticles on *Citrobacter* sp. A1 and *Enterococcus* sp. C1. *Journal of Microbiology, Immunology and Infection, 50*(4), 427-434.

Lau, K., Zainin, N., Abas, F., & Rukayadi, Y. (2014). Antibacterial and sporicidal activity of *Eugenia polyantha* Wight against *Bacillus cereus* and *Bacillus subtilis*. *Int J Curr Microbiol Appl Sci.*, *3*(12), 499-510.

Le, A.-T., Tam, P. D., Huy, P., Huy, T. Q., Van Hieu, N., Kudrinskiy, A., & Krutyakov, Y. A. (2010). Synthesis of oleic acid-stabilized silver nanoparticles and analysis of their antibacterial activity. *Materials Science and Engineering: C*, *30*(6), 910-916.

Lee, K.-M., Runyon, M., Herrman, T. J., Phillips, R., & Hsieh, J. (2015). Review of *Salmonella* detection and identification methods: aspects of rapid emergency response and food safety. *Food Control*, *47*, 264-276.

Lengke, M. F., Fleet, M. E., & Southam, G. (2007). Biosynthesis of silver nanoparticles by filamentous cyanobacteria from a silver (I) nitrate complex. *Langmuir*, *23*(5), 2694-2699.

Li, B., Zhao, Y., Liu, C., Chen, Z., & Zhou, D. (2014). Molecular pathogenesis of *Klebsiella pneumoniae*. *Future microbiology*, *9*(9), 1071-1081.

Li, G., He, D., Qian, Y., Guan, B., Gao, S., Cui, Y., Yokoyama, K., & Wang, L. (2011). Fungus-mediated green synthesis of silver nanoparticles using *Aspergillus terreus*. *International Journal of Molecular Sciences*, *13*(1), 466-476.

Li, K., & Zhang, F.-S. (2010). A novel approach for preparing silver nanoparticles under electron beam irradiation. *Journal of Nanoparticle Research*, *12*(4), 1423-1428.

Li, Q., Mahendra, S., Lyon, D. Y., Brunet, L., Liga, M. V., Li, D., & Alvarez, P. J. (2008). Antimicrobial nanomaterials for water disinfection and microbial control: potential applications and implications. *Water Research*, *42*(18), 4591-4602.

Li, W.-R., Xie, X.-B., Shi, Q.-S., Duan, S.-S., Ouyang, Y.-S., & Chen, Y.-B. (2011). Antibacterial effect of silver nanoparticles on *Staphylococcus aureus*. *Biometals*, *24*(1), 135-141.

Liou, P., Nayigiziki, F. X., Kong, F., Mustapha, A., & Lin, M. (2017). Cellulose nanofibers coated with silver nanoparticles as a SERS platform for detection of pesticides in apples. *Carbohydrate polymers*, *157*, 643-650.

Liu, S., & Huang, H. (2015). Assessments of antioxidant effect of black tea extract and its rationals by erythrocyte haemolysis assay, plasma oxidation assay and cellular antioxidant activity (CAA) assay. *Journal of Functional Foods*, *18*, 1095-1105.

Logan, N. (2012). *Bacillus* and relatives in foodborne illness. *Journal of applied microbiology*, *112*(3), 417-429.

Logeswari, P., Silambarasan, S., & Abraham, J. (2013). Ecofriendly synthesis of silver nanoparticles from commercially available plant powders and their antibacterial properties. *Scientia Iranica, 20*(3), 1049-1054.

Loo, Y. Y., Chieng, B. W., Nishibuchi, M., & Radu, S. (2012). Synthesis of silver nanoparticles by using tea leaf extract from *Camellia Sinensis*. *Int J Nanomedicine, 7*, 4263-4267.

Loza, K., Sengstock, C., Chernousova, S., Köller, M., & Epple, M. (2014). The predominant species of ionic silver in biological media is colloidally dispersed nanoparticulate silver chloride. *RSC Advances, 4*(67), 35290-35297.

Lund, T., De Buyser, M. L., & Granum, P. E. (2000). A new cytotoxin from *Bacillus cereus* that may cause necrotic enteritis. *Molecular microbiology, 38*(2), 254-261.

Madsen, K. T., Skov, M. N., Gill, S., & Kemp, M. (2017). Virulence Factors Associated with *Enterococcus faecalis* Infective Endocarditis: A Mini Review. *The open microbiology journal, 11*, 1-11.

Mahler, H., Pasi, A., Kramer, J. M., Schulte, P., Scoging, A. C., Bär, W., & Krähenbühl, S. (1997). Fulminant liver failure in association with the emetic toxin of *Bacillus cereus*. *New England Journal of Medicine, 336*(16), 1142-1148.

Mandal, D., Bolander, M. E., Mukhopadhyay, D., Sarkar, G., & Mukherjee, P. (2006). The use of microorganisms for the formation of metal nanoparticles and their application. *Applied Microbiology and Biotechnology, 69*(5), 485-492.

Mani-Lopez, E., García, H. S., & López-Malo, A. (2012). Organic acids as antimicrobials to control *Salmonella* in meat and poultry products. *Food Research International, 45*(2), 713-721.

Manjili, H. K., Jafari, H., Ramazani, A., & Davoudi, N. (2012). Anti-leishmanial and toxicity activities of some selected Iranian medicinal plants. *Parasitology research, 111*(5), 2115-2121.

Manning, L., Wallace, C. A., & Soon, J. M. (2016). Foodborne Disease Outbreaks *An Introduction*. In Manning, L., Wallace, C. A., andSoon, J. M. (Eds.), *Foodborne Diseases: Case Studies of Outbreaks in the Agri-Food Industries* (pp. 287-298).

Marambio-Jones, C., & Hoek, E. M. (2010). A review of the antibacterial effects of silver nanomaterials and potential implications for human health and the environment. *Journal of Nanoparticle Research, 12*(5), 1531-1551.

Marder, E. P., Garman, K. N., Ingram, L. A., & Dunn, J. R. (2014). Multistate outbreak of *Escherichia coli* O157: H7 associated with bagged salad. *Foodborne Pathog Dis, 11*(8), 593-595.

Marimuthu , J. A. A., Thangiah, S., & Irulappan, R. (2015). Green Synthesis of Silver Nanoparticles using *Dictyota bartayresiana* JV Lamouroux and their

Cytotoxic Potentials. *International Biological and Biomedical Journal, 1*(3), 112-118.

Martinez-Castanon, G., Nino-Martinez, N., Martinez-Gutierrez, F., Martinez-Mendoza, J., & Ruiz, F. (2008). Synthesis and antibacterial activity of silver nanoparticles with different sizes. *Journal of Nanoparticle Research, 10*(8), 1343-1348.

Martins, C. A., Leyhausen, G., Volk, J., & Geurtsen, W. (2015). Effects of alendronate on osteoclast formation and activity in vitro. *Journal of endodontics, 41*(1), 45-49.

Maslowski, D. (2016). A Simplified Process for Making Natural Liquid Soap. Retrieved May 20, 2017, from https://www.diynatural.com/how-to-make-liquid-soap-simple/

Matthews, K. R. (2006). Microorganisms associated with fruits and vegetables *Microbiology of fresh produce* (pp. 1-19): American Society of Microbiology.

Mazengia, E., Fisk, C., Liao, G., Huang, H., & Meschke, J. (2015). Direct observational study of the risk of cross-contamination during raw poultry handling: practices in private homes. *Food protection trends, 35*, 8-23.

McQuillan, J. S., Groenaga Infante, H., Stokes, E., & Shaw, A. M. (2012). Silver nanoparticle enhanced silver ion stress response in *Escherichia coli* K12. *Nanotoxicology, 6*(8), 857-866.

Medda, S., Hajra, A., Dey, U., Bose, P., & Mondal, N. K. (2015). Biosynthesis of silver nanoparticles from *Aloe vera* leaf extract and antifungal activity against *Rhizopus sp*. and *Aspergillus sp*. *Appl Nanosci, 5*(7), 875-880.

Meire, M., Coenye, T., Nelis, H., & De Moor, R. (2012). Evaluation of Nd: YAG and Er: YAG irradiation, antibacterial photodynamic therapy and sodium hypochlorite treatment on *Enterococcus faecalis* biofilms. *International Endodontic Journal, 45*(5), 482-491.

Merga, G., Wilson, R., Lynn, G., Milosavljevic, B. H., & Meisel, D. (2007). Redox catalysis on "naked" silver nanoparticles. *The Journal of Physical Chemistry C, 111*(33), 12220-12226.

Michael, A., Thompson, C., & Abramovitz, M. (1956). *Artemia salina* as a Test Organism for Bioassay. *Science (New York, NY), 123*(3194), 464.

Mirgorod, Y. A., & Borodina, V. G. (2013). Preparation and bactericidal properties of silver nanoparticles in aqueous tea leaf extract. *Inorganic Materials, 49*(10), 980-983.

Mirzajani, F., Ghassempour, A., Aliahmadi, A., & Esmaeili, M. A. (2011). Antibacterial effect of silver nanoparticles on *Staphylococcus aureus*. *Research in microbiology, 162*(5), 542-549.

Mishra, S., & Singh, H. (2015). Silver nanoparticles mediated altered gene expression of melanin biosynthesis genes in *Bipolaris sorokiniana*. *Microbiological research, 172*, 16-18.

Mittal, A. K., Chisti, Y., & Banerjee, U. C. (2013). Synthesis of metallic nanoparticles using plant extracts. *Biotechnology advances, 31*(2), 346-356.

MOH. (2007). Annual Report Ministry of Health Malaysia 2007: Ministry of Health Malaysia.

MOH. (2017). Case Definitions for Infectious Diseases in Malaysia (Division, D. C., Trans.) (3rd ed.): Ministry of Health.

Mohammed Fayaz, A., Balaji, K., Girilal, M., Kalaichelvan, P., & Venkatesan, R. (2009). Mycobased synthesis of silver nanoparticles and their incorporation into sodium alginate films for vegetable and fruit preservation. *Journal of Agricultural and Food Chemistry, 57*(14), 6246-6252.

Moreno, M. F., Sarantinopoulos, P., Tsakalidou, E., & De Vuyst, L. (2006). The role and application of enterococci in food and health. *International Journal of Food Microbiology, 106*(1), 1-24.

Møretrø, T., Heir, E., Nesse, L. L., Vestby, L. K., & Langsrud, S. (2012). Control of *Salmonella* in food related environments by chemical disinfection. *Food Research International, 45*(2), 532-544.

Morones, J. R., Elechiguerra, J. L., Camacho, A., Holt, K., Kouri, J. B., Ramírez, J. T., & Yacaman, M. J. (2005). The bactericidal effect of silver nanoparticles. *Nanotechnology, 16*(10), 2346-2353.

Morsy, M. K., Khalaf, H. H., Sharoba, A. M., El-Tanahi, H. H., & Cutter, C. N. (2014). Incorporation of Essential Oils and Nanoparticles in Pullulan Films to Control Foodborne Pathogens on Meat and Poultry Products. *Journal of food science, 79*(4), 675-684.

Mouxing, F., Qingbiao, L., Daohua, S., Yinghua, L., Ning, H., Xu, D., Huixuan, W., & Huang, J. (2006). Rapid Preparation Process of Silver Nanoparticles by Bioreduction and Their Characterizations11Supported by the National Natural Science Foundation of China (No. 20376076). *Chinese Journal of Chemical Engineering, 14*(1), 114-117.

Mukherjee, P., Ahmad, A., Mandal, D., Senapati, S., Sainkar, S. R., Khan, M. I., Parishcha, R., Ajaykumar, P., Alam, M., & Kumar, R. (2001). Fungus-mediated synthesis of silver nanoparticles and their immobilization in the mycelial matrix: a novel biological approach to nanoparticle synthesis. *Nano Letters, 1*(10), 515-519.

Mukherjee, P., Roy, M., Mandal, B., Dey, G., Mukherjee, P., Ghatak, J., Tyagi, A., & Kale, S. (2008). Green synthesis of highly stabilized nanocrystalline silver particles by a non-pathogenic and agriculturally important fungus *T. asperellum*. *Nanotechnology, 19*(7), 075103-075110.

Murugan, K., Sanoopa, C., Madhiyazhagan, P., Dinesh, D., Subramaniam, J., Panneerselvam, C., Roni, M., Suresh, U., Nicoletti, M., & Alarfaj, A. A. (2016). Rapid biosynthesis of silver nanoparticles using *Crotalaria verrucosa* leaves against the dengue vector *Aedes aegypti:* what happens around? An analysis of dragonfly predatory behaviour after exposure at ultra-low doses. *Natural product research, 30*(7), 826-833.

Muthukkumarasamy, S., Sharadha, A., Vignesh, S., Dhanabalan, K., & Gurunathan, K. (2012). Extracellular synthesis of polygonal silver nanoparticles using extract of *Escherichia coli* ATCC 25922 and its antibacterial activities. *Digest Journal of Nanomaterials and Biostructures, 7*(4), 1419-1426.

Muthukumaran, U., Govindarajan, M., Rajeswary, M., & Hoti, S. (2015). Synthesis and characterization of silver nanoparticles using *Gmelina asiatica* leaf extract against filariasis, dengue, and malaria vector mosquitoes. *Parasitology research, 114*(5), 1817-1827.

Nabikhan, A., Kandasamy, K., Raj, A., & Alikunhi, N. M. (2010). Synthesis of antimicrobial silver nanoparticles by callus and leaf extracts from saltmarsh plant, *Sesuvium portulacastrum* L. *Colloids and Surfaces B: Biointerfaces, 79*(2), 488-493.

Nadagouda, M. N., Speth, T. F., & Varma, R. S. (2011). Microwave-assisted green synthesis of silver nanostructures. *Accounts of Chemical Research, 44*(7), 469-478.

Nadworny, P. L., Wang, J., Tredget, E. E., & Burrell, R. E. (2010). Anti-inflammatory activity of nanocrystalline silver-derived solutions in porcine contact dermatitis. *Journal of inflammation, 7*(1), 13-32.

Nair, B., & Pradeep, T. (2002). Coalescence of nanoclusters and formation of submicron crystallites assisted by *Lactobacillus* strains. *Crystal Growth & Design, 2*(4), 293-298.

Naja, G., Bouvrette, P., Hrapovic, S., & Luong, J. H. (2007). Raman-based detection of bacteria using silver nanoparticles conjugated with antibodies. *Analyst, 132*(7), 679-686.

Nanda, A., & Majeed, S. (2014). Enhanced antibacterial efficacy of biosynthesized AgNPs from *Penicillium glabrum* (MTCC1985) pooled with different drugs. *International Journal PharmTech Research, 6*(1), 217-223.

Narayanan, K. B., & Park, H. H. (2014). Antifungal activity of silver nanoparticles synthesized using turnip leaf extract (Brassica rapa L.) against wood rotting pathogens. *European journal of plant pathology, 140*(2), 185-192.

Narayanan, K. B., & Sakthivel, N. (2010). Biological synthesis of metal nanoparticles by microbes. *Advances in colloid and interface science, 156*(1), 1-13.

Nasr, N. (2015). Applications of nanotechnology in food microbiology. *International Journal of Current Microbiology and Applied Sciences, 4*(4), 846-853.

Navarre, W. W., & Schneewind, O. (1999). Surface proteins of Gram-positive bacteria and mechanisms of their targeting to the cell wall envelope. *Microbiology and Molecular Biology Reviews, 63*(1), 174-229.

Nawaz, M., Khan, S., Tran, Q., Sung, K., Khan, A., Adamu, I., & Steele, R. (2012). Isolation and characterization of multidrug-resistant *Klebsiella* spp. isolated from shrimp imported from Thailand. *International Journal of Food Microbiology, 155*(3), 179-184.

Nejad, M. S., Bonjar, G. H. S., Khatami, M., Amini, A., & Aghighi, S. (2016). *In vitro* and *in vivo* antifungal properties of silver nanoparticles against *Rhizoctonia solani*, a common agent of rice sheath blight disease. *IET nanobiotechnology, 11*(3), 236-240.

New, C. Y., Ubong, A., Premarathne, J. M. K. J. K., Thung, T. Y., Lee, E., Chang, W. S., Loo, Y. Y., Kwan, S. Y., Tan, C. W., Kuan, C. H., & Son, R. (2017). Microbiological food safety in Malaysia from the academician's perspective. *Food Research, 1*(6), 183-202.

Nguyen, Y., & Sperandio, V. (2012). Enterohemorrhagic *E. coli* (EHEC) pathogenesis. *Frontiers in cellular and infection microbiology, 2*, 90-96.

Nidaullah, H., Abirami, N., Shamila-Syuhada, A. K., Chuah, L.-O., Nurul, H., Tan, T. P., Abidin, F. W. Z., & Rusul, G. (2017). Prevalence of Salmonella in poultry processing environments in wet markets in Penang and Perlis, Malaysia. *Veterinary world, 10*(3), 286-292.

Ninganagouda, S., Rathod, V., Singh, D., Hiremath, J., Singh, A. K., Mathew, J., & ul-Haq, M. (2014). Growth Kinetics and Mechanistic Action of Reactive Oxygen Species Released by Silver Nanoparticles from *Aspergillus niger* on *Escherichia coli*. *BioMed research international, 2014*, 9-17.

Normanno, G., Corrente, M., La Salandra, G., Dambrosio, A., Quaglia, N., Parisi, A., Greco, G., Bellacicco, A., Virgilio, S., & Celano, G. (2007). Methicillin-resistant *Staphylococcus aureus* (MRSA) in foods of animal origin product in Italy. *International Journal of Food Microbiology, 117*(2), 219-222.

Nunes, B. S., Carvalho, F. D., Guilhermino, L. M., & Van Stappen, G. (2006). Use of the genus *Artemia* in ecotoxicity testing. *Environmental Pollution, 144*(2), 453-462.

O'Bryan, C. A., Crandall, P. G., & Ricke, S. C. (2018). Antimicrobial Resistance in Foodborne Pathogens *Food and Feed Safety Systems and Analysis* (pp. 99-115). United States: Elsevier.

Oei, J. D., Zhao, W. W., Chu, L., DeSilva, M. N., Ghimire, A., Rawls, H. R., & Whang, K. (2012). Antimicrobial acrylic materials with in situ generated silver nanoparticles. *J Biomed Mater Res B Appl Biomater, 100*(2), 409-415.

Oliver, S. P., Jayarao, B. M., & Almeida, R. A. (2005). Foodborne pathogens in milk and the dairy farm environment: food safety and public health implications. *Foodborne Pathog Dis, 2*(2), 115-129.

Ostyn, A., De Buyser, M., Guillier, F., Groult, J., Felix, B., Salah, S., Delmas, G., & Hennekinne, J. (2010). First evidence of a food poisoning outbreak due to staphylococcal enterotoxin type E, France, 2009. *Euro Surveillance, 15*(13), 1-4.

Otaqsara, S. T. (2011). Biosynthesis of quasi-spherical Ag nanoparticle by *Pseudomonas aeruginosa* as a bioreducing agent. *The European Physical Journal-Applied Physics, 56*(3), 30402-30405.

Otari, S. V., Patil, R. M., Ghosh, S. J., Thorat, N. D., & Pawar, S. H. (2015). Intracellular synthesis of silver nanoparticle by actinobacteria and its antimicrobial activity. *Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy, 136*, 1175-1180.

Özyürek, M., Güngör, N., Baki, S., Güçlü, K., & Apak, R. a. (2012). Development of a silver nanoparticle-based method for the antioxidant capacity measurement of polyphenols. *Analytical chemistry, 84*(18), 8052-8059.

Pal, S., Tak, Y. K., & Song, J. M. (2007). Does the antibacterial activity of silver nanoparticles depend on the shape of the nanoparticle? A study of the Gram-negative bacterium *Escherichia coli*. *Applied and environmental microbiology, 73*(6), 1712-1720.

Parihar, V. S., Barbuddhe, S., Danielsson-Tham, M.-L., & Tham, W. (2008). Isolation and characterization of *Listeria* species from tropical seafoods. *Food Control, 19*(6), 566-569.

Patel, G., Huprikar, S., Factor, S. H., Jenkins, S. G., & Calfee, D. P. (2008). Outcomes of carbapenem-resistant *Klebsiella pneumoniae* infection and the impact of antimicrobial and adjunctive therapies. *Infect Control Hosp Epidemiol, 29*(12), 1099-1106.

Patil, R. S., Kokate, M. R., Jambhale, C. L., Pawar, S. M., Han, S. H., & Kolekar, S. S. (2012). One-pot synthesis of PVA-capped silver nanoparticles their characterization and biomedical application. *Advances in Natural Sciences: Nanoscience and Nanotechnology, 3*(1), 015013-015019.

Pereira, V., Lopes, C., Castro, A., Silva, J., Gibbs, P., & Teixeira, P. (2009). Characterization for enterotoxin production, virulence factors, and antibiotic susceptibility of *Staphylococcus aureus* isolates from various foods in Portugal. *Food Microbiology, 26*(3), 278-282.

Persat, A., Nadell, C. D., Kim, M. K., Ingremeau, F., Siryaporn, A., Drescher, K., Wingreen, N. S., Bassler, B. L., Gitai, Z., & Stone, H. A. (2015). The mechanical world of bacteria. *Cell, 161*(5), 988-997.

Phull, A.-R., Abbas, Q., Ali, A., Raza, H., kim, S. J., Zia, M., & Haq, I.-u. (2016). Antioxidant, cytotoxic and antimicrobial activities of green synthesized silver nanoparticles from crude extract of *Bergenia ciliata*. *Future Journal of Pharmaceutical Sciences, 2*(1), 31-36.

Podschun, R., & Ullmann, U. (1998). *Klebsiella* spp. as nosocomial pathogens: epidemiology, taxonomy, typing methods, and pathogenicity factors. *Clinical microbiology reviews, 11*(4), 589-603.

Pourali, P., Baserisalehi, M., Afsharnezhad, S., Behravan, J., Alavi, H., & Hosseini, A. (2012). Biological synthesis of silver and gold nanoparticles by bacteria in different temperatures (37 °C and 50 °C). *Journal of Pure and Applied Microbiology, 6*(2), 757-763.

Prabhu, S., & Poulose, E. K. (2012). Silver nanoparticles: mechanism of antimicrobial action, synthesis, medical applications, and toxicity effects. *International Nano Letters, 2*(1), 32-41.

Prakash, A., Sharma, S., Ahmad, N., Ghosh, A., & Sinha, P. (2011). Synthesis of AgNPs by *Bacillus cereus* bacteria and their antimicrobial potential. *Journal of Biomaterials and Nanobiotechnology, 2*(2), 156-162.

Prasad, T., & Elumalai, E. (2011). Biofabrication of Ag nanoparticles using *Moringa oleifera* leaf extract and their antimicrobial activity. *Asian Pacific Journal of Tropical Biomedicine, 1*(6), 439-442.

Priyaragini, S., Sathishkumar, S., & Bhaskararao, K. (2013). Biosynthesis of silver nanoparticles using actinobacteria and evaluating its antimicrobial and cytotoxicity activity. *Int J Pharm Pharm Sci, 5*(2), 709-712.

Puah, S., Chua, K., & Tan, J. (2016). Virulence Factors and Antibiotic Susceptibility of *Staphylococcus aureus* Isolates in Ready-to-Eat Foods: Detection of *S. aureus* Contamination and a High Prevalence of Virulence Genes. *International Journal of Environmental Research and Public Health, 13*(2), 199-107.

Raguenaud, M., Le Hello, S., Salah, S., Weill, F.-X., Brisabois, A., Delmas, G., & Germonneau, P. (2010). Epidemiological and microbiological investigation of a large outbreak of monophasic *Salmonella* Typhimurium 4, 5, 12: i:-in schools associated with imported beef in Poitiers, France, October 2010. *Eurosurveillance, 17*, 40-46.

Rai, M., Deshmukh, S., Ingle, A., & Gade, A. (2012). Silver nanoparticles: the powerful nanoweapon against multidrug ‐ resistant bacteria. *Journal of applied microbiology, 112*(5), 841-852.

Rajabi, S., Ramazani, A., Hamidi, M., & Naji, T. (2015). *Artemia salina* as a model organism in toxicity assessment of nanoparticles. *DARU Journal of Pharmaceutical Sciences, 23*(1), 20-25.

Rajakumar, G., Gomathi, T., Thiruvengadam, M., Devi Rajeswari, V., Kalpana, V. N., & Chung, I.-M. (2017). Evaluation of anti-cholinesterase, antibacterial and cytotoxic activities of green synthesized silver nanoparticles using from *Millettia pinnata* flower extract. *Microbial Pathogenesis, 103*(Supplement C), 123-128.

Rajeshkumar, S., Malarkodi, C., Paulkumar, K., Vanaja, M., Gnanajobitha, G., & Annadurai, G. (2013). Intracellular and extracellular biosynthesis of silver nanoparticles by using marine bacteria *Vibrio alginolyticus*. *Nanoscience and Nanotechnology, 3*(1), 21-25.

Ramazani, A., Zakeri, S., Sardari, S., Khodakarim, N., & Djadidt, N. D. (2010). *In vitro* and *in vivo* anti-malarial activity of *Boerhavia elegans* and *Solanum surattense*. *Malaria Journal, 9*(1), 124-131.

Rangel, J. M., Sparling, P. H., Crowe, C., Griffin, P. M., & Swerdlow, D. L. (2005). Epidemiology of *Escherichia coli* O157: H7 outbreaks, United States, 1982–2002. *Emerg Infect Dis, 11*(4), 603-609.

Raut, R. W., Mendhulkar, V. D., & Kashid, S. B. (2014). Photosensitized synthesis of silver nanoparticles using *Withania somnifera* leaf powder and silver nitrate. *Journal of Photochemistry and Photobiology B: Biology, 132*, 45-55.

Rauwel, P., Küünal, S., Ferdov, S., & Rauwel, E. (2015). A review on the green synthesis of silver nanoparticles and their morphologies studied via TEM. *Advances in Materials Science and Engineering, 2015*, 9-17.

Ravichandran, V., Vasanthi, S., Shalini, S., Shah, S. A. A., & Harish, R. (2016). Green synthesis of silver nanoparticles using *Atrocarpus altilis* leaf extract and the study of their antimicrobial and antioxidant activity. *Materials Letters, 180*, 264-267.

Raza, M. A., Kanwal, Z., Rauf, A., Sabri, A. N., Riaz, S., & Naseem, S. (2016). Size- and shape-dependent antibacterial studies of silver nanoparticles synthesized by wet chemical routes. *Nanomaterials, 6*(4), 74-88.

Reis, A. L., Montanhini, M., Bittencourt, J. V., Destro, M. T., & Bersot, L. S. (2013). Gene detection and toxin production evaluation of hemolysin BL of *Bacillus cereus* isolated from milk and dairy products marketed in Brazil. *Brazilian Journal of Microbiology, 44*(4), 1195-1198.

Riedel, S., & Kaupp, M. (2009). The highest oxidation states of the transition metal elements. *Coordination Chemistry Reviews, 253*(5), 606-624.

Rocourt, J. R., Moy, G. G., Vierk, K., & Schlundt, J. (2003). *The present state of foodborne disease in OECD countries*. Geneva: World Health Organization (WHO).

Rónavári, A., Kovács, D., Igaz, N., Vágvölgyi, C., Boros, I. M., Kónya, Z., Pfeiffer, I., & Kiricsi, M. (2017). Biological activity of green-synthesized silver nanoparticles depends on the applied natural extracts: a comprehensive study. *Int J Nanomedicine, 12*, 871-883.

Roy, S., Mukherjee, T., Chakraborty, S., & Das, T. K. (2013). Biosynthesis, characterisation and antifungal activity of silver nanoparticles synthesized by the fungus *Aspergillus foetidus* MTCC8876. *Digest Journal of Nanomaterials and Biostructures, 8*(1), 197-205.

Ryan, M. P., O'Dwyer, J., & Adley, C. C. (2017). Evaluation of the Complex Nomenclature of the Clinically and Veterinary Significant Pathogen *Salmonella*. *BioMed research international, 2017*, 6-11.

Sadeghi, B., Rostami, A., & Momeni, S. (2015). Facile green synthesis of silver nanoparticles using seed aqueous extract of *Pistacia atlantica* and its antibacterial activity. *Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy, 134*, 326-332.

San, Y., Don, M. C. M., & Selatan, S. (2012). Instantaneous biosynthesis of silver nanoparticles by selected macro fungi. *Australian Journal of Basic and Applied Sciences, 6*(1), 86-88.

Sangian, H., Faramarzi, H., Yazdinezhad, A., Mousavi, S. J., Zamani, Z., Noubarani, M., & Ramazani, A. (2013). Antiplasmodial activity of ethanolic extracts of some selected medicinal plants from the northwest of Iran. *Parasitology research, 112*(11), 3697-3701.

Sauer, U. G., Vogel, S., Hess, A., Kolle, S. N., Ma-Hock, L., van Ravenzwaay, B., & Landsiedel, R. (2013). *In vivo–in vitro* comparison of acute respiratory tract toxicity using human 3D airway epithelial models and human A549 and murine 3T3 monolayer cell systems. *Toxicology in Vitro, 27*(1), 174-190.

Sayed, A. E.-D. H., & Soliman, H. A. (2017). Developmental toxicity and DNA damaging properties of silver nanoparticles in the catfish (*Clarias gariepinus*). *Mutation Research/Genetic Toxicology and Environmental Mutagenesis, 822*, 34-40.

Scallan, E., Hoekstra, R. M., Angulo, F. J., Tauxe, R. V., Widdowson, M.-A., Roy, S. L., Jones, J. L., & Griffin, P. M. (2011). Foodborne illness acquired in the United States—major pathogens. *Emerg Infect Dis, 17*(1), 7-15.

Schmid, D., Fretz, R., Winter, P., Mann, M., Höger, G., Stöger, A., Ruppitsch, W., Ladstätter, J., Mayer, N., & de Martin, A. (2009). Outbreak of staphylococcal food intoxication after consumption of pasteurized milk products, June 2007, Austria. *Wiener klinische Wochenschrift, 121*(3), 125-131.

Seitz, F., Rosenfeldt, R. R., Storm, K., Metreveli, G., Schaumann, G. E., Schulz, R., & Bundschuh, M. (2015). Effects of silver nanoparticle properties, media pH and dissolved organic matter on toxicity to *Daphnia magna*. *Ecotoxicology and environmental safety, 111*, 263-270.

Selvam, K., Sudhakar, C., Govarthanan, M., Thiyagarajan, P., Sengottaiyan, A., Senthilkumar, B., & Selvankumar, T. (2017). Eco-friendly biosynthesis and characterization of silver nanoparticles using *Tinospora cordifolia* (Thunb.) Miers and evaluate its antibacterial, antioxidant potential. *J Radiat Res Appl Sci, 10*(1), 6-12.

Senthilkumar, S., & Sivakumar, T. (2014). Green tea (Camellia sinensis) mediated synthesis of zinc oxide (ZnO) nanoparticles and studies on their antimicrobial activities. *Int J Pharm Pharm Sci, 6*(6), 461-465.

Sentkowska, A., & Pyrzynska, K. (2017). Flavonoid Content and Antioxidant Properties of Different Black Tea Infusions. *Journal of Nutrition and Health Sciences, 4*(1), 1-6.

Sepunaru, L., Tschulik, K., Batchelor-McAuley, C., Gavish, R., & Compton, R. G. (2015). Electrochemical detection of single *E. coli* bacteria labeled with silver nanoparticles. *Biomaterials science, 3*(6), 816-820.

Seshadri, S., Prakash, A., & Kowshik, M. (2012). Biosynthesis of silver nanoparticles by marine bacterium, *Idiomarina* sp. PR58-8. *Bulletin of Materials Science, 35*(7), 1201-1205.

Shameli, K., Ahmad, M. B., Shabanzadeh, P., Al-Mulla, E. A. J., Zamanian, A., Abdollahi, Y., Jazayeri, S. D., Eili, M., Jalilian, F. A., & Haroun, R. Z. (2014). Effect of *Curcuma longa* tuber powder extract on size of silver nanoparticles prepared by green method. *Research on Chemical Intermediates, 40*(3), 1313-1325.

Shankar, S. S., Ahmad, A., & Sastry, M. (2003). Geranium leaf assisted biosynthesis of silver nanoparticles. *Biotechnology progress, 19*(6), 1627-1631.

Shanmugaiah, V., Harikrishnan, H., Al-Harbi, N., Shine, K., Khaled, J., Balasubramanian, N., & Kumar, R. S. (2015). Facile synthesis of silver nanoparticles using *Streptomyces* sp. VSMGT1014 and their antimicrobial efficiency. *Digest Journal of Nanomaterials and Biostructures, 10*(1), 179-187.

Sharapov, U. M., Wendel, A. M., Davis, J. P., Keene, W. E., Farrar, J., Sodha, S., Hyytia-Trees, E., Leeper, M., Gerner-Smidt, P., & Griffin, P. M. (2016). Multistate outbreak of *Escherichia coli* O157: H7 infections associated with consumption of fresh spinach: United States, 2006. *Journal of Food Protection, 79*(12), 2024-2030.

Shelar, G. B., & Chavan, A. M. (2014). Fungus-mediated biosynthesis of silver nanoparticles and its antibacterial activity. *Archives of Applied Science Research, 6*(2), 111-114.

Shen, L., Wang, X., Wang, Z., Wu, Y., & Chen, J. (2008). Studies on tea protein extraction using alkaline and enzyme methods. *Food chemistry, 107*(2), 929-938.

Shiota, M., Saitou, K., Mizumoto, H., Matsusaka, M., Agata, N., Nakayama, M., Kage, M., Tatsumi, S., Okamoto, A., & Yamaguchi, S. (2010). Rapid detoxification of cereulide in *Bacillus cereus* food poisoning. *Pediatrics, 125*(4), 951-955.

Shrivas, K., Nirmalkar, N., Ghosale, A., Thakur, S. S., & Shankar, R. (2016). Enhancement of plasmonic resonance through an exchange reaction on the surface of silver nanoparticles: application to the highly selective detection of triazophos pesticide in food and vegetable samples. *RSC Advances, 6*(84), 80739-80747.

Singh, R., Shedbalkar, U. U., Wadhwani, S. A., & Chopade, B. A. (2015). Bacteriagenic silver nanoparticles: synthesis, mechanism, and applications. *Applied Microbiology and Biotechnology*, *99*(11), 4579-4593.

Singh, R., Wagh, P., Wadhwani, S., Gaidhani, S., Kumbhar, A., Bellare, J., & Chopade, B. A. (2013). Synthesis, optimization, and characterization of silver nanoparticles from *Acinetobacter calcoaceticus* and their enhanced antibacterial activity when combined with antibiotics. *Int J Nanomedicine*, *8*, 4277-4290.

Sintubin, L., De Windt, W., Dick, J., Mast, J., van der Ha, D., Verstraete, W., & Boon, N. (2009). Lactic acid bacteria as reducing and capping agent for the fast and efficient production of silver nanoparticles. *Applied Microbiology and Biotechnology, 84*(4), 741-749.

Slayton, R. B., Turabelidze, G., Bennett, S. D., Schwensohn, C. A., Yaffee, A. Q., Khan, F., Butler, C., Trees, E., Ayers, T. L., & Davis, M. L. (2013). Outbreak of Shiga toxin-producing *Escherichia coli* (STEC) O157: H7 associated with romaine lettuce consumption, 2011. *PLoS One, 8*(2), e55300.

Sondi, I., & Salopek-Sondi, B. (2004). Silver nanoparticles as antimicrobial agent: a case study on *E. coli* as a model for Gram-negative bacteria. *J. Colloid Interface Sci., 275*(1), 177-182.

Song, K. C., Lee, S. M., Park, T. S., & Lee, B. S. (2009). Preparation of colloidal silver nanoparticles by chemical reduction method. *Korean Journal of Chemical Engineering, 26*(1), 153-155.

Sriram, M. I., Kalishwaralal, K., & Gurunathan, S. (2012). Biosynthesis of silver and gold nanoparticles using *Bacillus licheniformis*. *Nanoparticles in Biology and Medicine: Methods and Protocols*, 33-43.

Srivastava, P., Bragança, J., Ramanan, S. R., & Kowshik, M. (2013). Synthesis of silver nanoparticles using haloarchaeal isolate *Halococcus salifodinae* BK3. *Extremophiles, 17*(5), 821-831.

StatNano. (2017). Silver nanoparticles used in 75% of nanoproducts in medicine industry. from http://statnano.com/news/60821

Stepanov, A. (2004). Optical properties of metal nanoparticles synthesized in a polymer by ion implantation: a review. *Technical Physics, 49*(2), 143-153.

Stewart, G. C. (2005). *Staphylococcus aureus*. In Fratamico, P. M., Bhunia, A. K., andSmith, J. L. (Eds.), *Foodborne pathogens: microbiology and molecular biology*: Horizon Scientific Press.

Stickel, F., Droz, S., Patsenker, E., Bögli-Stuber, K., Aebi, B., & Leib, S. L. (2009). Severe hepatotoxicity following ingestion of Herbalife® nutritional supplements contaminated with Bacillus subtilis. *Journal of hepatology, 50*(1), 111-117.

Stiles, M. E. (1989). Less recognized or presumptive foodborne pathogenic bacteria. In Doyle, M. P. (Ed.), *Foodborne Bacterial Pathogens* (pp. 673-733). New York: Marcel Dekker Inc.

Strateva, T., Atanasova, D., Savov, E., Petrova, G., & Mitov, I. (2016). Incidence of virulence determinants in clinical *Enterococcus faecalis* and *Enterococcus faecium* isolates collected in Bulgaria. *Brazilian Journal of Infectious Diseases, 20*(2), 127-133.

Struve, C., & Krogfelt, K. A. (2004). Pathogenic potential of environmental *Klebsiella pneumoniae* isolates. *Environmental microbiology, 6*(6), 584-590.

Su, H.-P., Chiu, S.-I., Tsai, J.-L., Lee, C.-L., & Pan, T.-M. (2005). Bacterial food-borne illness outbreaks in northern Taiwan, 1995–2001. *Journal of infection and chemotherapy, 11*(3), 146-151.

Suber, L., Sondi, I., Matijević, E., & Goia, D. V. (2005). Preparation and the mechanisms of formation of silver particles of different morphologies in homogeneous solutions. *Journal of Colloid and Interface Science, 288*(2), 489-495.

Suh, W. H., Suslick, K. S., Stucky, G. D., & Suh, Y.-H. (2009). Nanotechnology, nanotoxicology, and neuroscience. *Progress in neurobiology, 87*(3), 133-170.

Sun, Q., Cai, X., Li, J., Zheng, M., Chen, Z., & Yu, C.-P. (2014). Green synthesis of silver nanoparticles using tea leaf extract and evaluation of their stability and antibacterial activity. *Colloids and Surfaces A: Physicochemical and Engineering Aspects, 444*, 226-231.

Suresh, G., Gunasekar, P. H., Kokila, D., Prabhu, D., Dinesh, D., Ravichandran, N., Ramesh, B., Koodalingam, A., & Siva, G. V. (2014). Green synthesis of silver nanoparticles using *Delphinium denudatum* root extract exhibits antibacterial and mosquito larvicidal activities. *Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy, 127*, 61-66.

Suresh, U., Murugan, K., Panneerselvam, C., Rajaganesh, R., Roni, M., Al-Aoh, H. A. N., Trivedi, S., Rehman, H., Kumar, S., & Higuchi, A. (2017). *Suaeda maritima*-based herbal coils and green nanoparticles as potential biopesticides against the dengue vector *Aedes aegypti* and the tobacco cutworm *Spodoptera litura*. *Physiological and Molecular Plant Pathology*, 1-11.

Suriati, G., Mariatti, M., & Azizan, A. (2014). Synthesis of silver nanoparticles by chemical reduction method: Effect of reducing agent and surfactant concentration. *International Journal of Automotive and Mechanical Engineering, 10*, 1920-1927.

Takabe, F., & Oya, M. (1976). An autopsy case of food poisoning associated with *Bacillus cereus*. *Forensic science, 7*(2), 97-101.

Tamboli, D. P., & Lee, D. S. (2013). Mechanistic antimicrobial approach of extracellularly synthesized silver nanoparticles against Gram-positive and Gram-negative bacteria. *Journal of hazardous materials, 260*, 878-884.

Tamuly, C., Hazarika, M., Borah, S. C., Das, M. R., & Boruah, M. P. (2013). In situ biosynthesis of Ag, Au and bimetallic nanoparticles using Piper pedicellatum C. DC: Green chemistry approach. *Colloids and Surfaces B: Biointerfaces, 102*, 627-634.

Tao, A., Sinsermsuksakul, P., & Yang, P. (2006). Polyhedral silver nanocrystals with distinct scattering signatures. *Angewandte Chemie, 118*(28), 4713-4717.

Tasara, T., Klumpp, J., Bille, J., & Stephan, R. (2016). Genome sequences of *Listeria monocytogenes* strains responsible for cheese-and cooked ham product-associated Swiss listeriosis outbreaks in 2005 and 2011. *Genome announcements, 4*(2), e00106-00116.

Tauxe, R. V., Doyle, M. P., Kuchenmüller, T., Schlundt, J., & Stein, C. (2010). Evolving public health approaches to the global challenge of foodborne infections. *International Journal of Food Microbiology, 139*, S16-S28.

Telzak, E. E., Budnick, L. D., Greenberg, M. S. Z., Blum, S., Shayegani, M., Benson, C. E., & Schultz, S. (1990). A nosocomial outbreak of *Salmonella enteritidis* infection due to the consumption of raw eggs. *New England Journal of Medicine, 323*(6), 394-397.

Thong, K. L. (2006). Surveillance and subtyping of *Salmonella* spp. in Malaysia. 10th annual PulseNet updatemeeting, 2e6 April 2006, Florida, USA. Retrieved November 22, 2017 http://www.aphl.org/profdev/conferences/proceedings/Pages/10thAnnualPulseNetUpdateMeeting.aspx

Trevejo, R. T., Barr, M. C., & Robinson, R. A. (2005). Important emerging bacterial zoonotic infections affecting the immunocompromised. *Veterinary research, 36*(3), 493-506.

Vala, A. K., Shah, S., & Patel, R. (2014). Biogenesis of silver nanoparticles by marine-derived fungus *Aspergillus flavus* from Bhavnagar Coast, Gulf of Khambhat, India. *Journal of Marine Biology & Oceanography, 3*(1), 2-7.

Välimaa, A.-L., Tilsala-Timisjärvi, A., & Virtanen, E. (2015). Rapid detection and identification methods for *Listeria monocytogenes* in the food chain–a review. *Food Control, 55*, 103-114.

Van Asselt, E., De Jong, A., De Jonge, R., & Nauta, M. (2008). Cross - contamination in the kitchen: estimation of transfer rates for cutting boards, hands and knives. *Journal of applied microbiology, 105*(5), 1392-1401.

Van Doren, J. M., Neil, K. P., Parish, M., Gieraltowski, L., Gould, L. H., & Gombas, K. L. (2013). Foodborne illness outbreaks from microbial contaminants in spices, 1973–2010. *Food Microbiology, 36*(2), 456-464.

Vázquez-Boland, J. A., Kuhn, M., Berche, P., Chakraborty, T., Domínguez-Bernal, G., Goebel, W., González-Zorn, B., Wehland, J., & Kreft, J. (2001). *Listeria* pathogenesis and molecular virulence determinants. *Clinical microbiology reviews, 14*(3), 584-640.

Veerakumar, K., Govindarajan, M., & Hoti, S. (2014). Evaluation of plant-mediated synthesized silver nanoparticles against vector mosquitoes. *Parasitology research, 113*(12), 4567-4577.

Veno, J. (2011). Cholera outbreak in Limbang under control. Retrieved Novmber 27, 2017 http://www.theborneopost.com/2011/03/16/cholera-outbreak-in-limbang-under-control/

Verma, V. C., Kharwar, R. N., & Gange, A. C. (2010). Biosynthesis of antimicrobial silver nanoparticles by the endophytic fungus *Aspergillus clavatus*. *Nanomedicine, 5*(1), 33-40.

Vijayan, S. R., Santhiyagu, P., Singamuthu, M., Kumari Ahila, N., Jayaraman, R., & Ethiraj, K. (2014). Synthesis and characterization of silver and gold nanoparticles using aqueous extract of seaweed, Turbinaria conoides, and their antimicrofouling activity. *The Scientific World Journal, 2014*, 10-19.

Vijayaraghavan, K., Nalini, S. K., Prakash, N. U., & Madhankumar, D. (2012). One step green synthesis of silver nano/microparticles using extracts of *Trachyspermum ammi* and *Papaver somniferum*. *Colloids and Surfaces B: Biointerfaces, 94*, 114-117.

Wang, C., Kim, Y. J., Singh, P., Mathiyalagan, R., Jin, Y., & Yang, D. C. (2016). Green synthesis of silver nanoparticles by *Bacillus methylotrophicus*, and their antimicrobial activity. *Artificial Cells, Nanomedicine, and Biotechnology, 44*(4), 1127-1132.

Wang, P., Lombi, E., Sun, S., Scheckel, K. G., Malysheva, A., McKenna, B. A., Menzies, N. W., Zhao, F.-J., & Kopittke, P. M. (2017). Characterizing the uptake, accumulation and toxicity of silver sulfide nanoparticles in plants. *Environmental Science: Nano, 4*(2), 448-460.

WHO. (2003). 8th Report 1999-2000 of WHO Surveillance Programme for Control of Foodborne Infectiions and Intoxications in Europe. Retrieved April 2013, from World Health Organization http://www.bfr.bund.de/internet/8threport/8threp_fr.htm

WHO. (2014). Initiative to estimate the global burden of foodborne diseases: Information and publications. *World Health Organization (WHO)*.

Wiley, B., Sun, Y., Mayers, B., & Xia, Y. (2005). Shape‐controlled synthesis of metal nanostructures: the case of silver. *Chemistry-A European Journal, 11*(2), 454-463.

Woh, P. Y., Thong, K. L., Behnke, J. M., Lewis, J. W., & Zain, S. N. M. (2017). Characterization of Nontyphoidal *Salmonella* Isolates from Asymptomatic Migrant Food Handlers in Peninsular Malaysia. *J Food Prot, 80*(8), 1378-1383.

Woh, P. Y., Thong, K. L., Lim, Y. A. L., Behnke, J. M., Lewis, J. W., & Mohd Zain, S. N. (2017). Microorganisms as an Indicator of Hygiene Status Among

Migrant Food Handlers in Peninsular Malaysia. *Asia Pacific Journal of Public Health, 29*(7), 599-607.

Wong, K. K., & Liu, X. (2010). Silver nanoparticles—the real "silver bullet" in clinical medicine? *Medicinal Chemistry Communications, 1*(2), 125-131.

Wu, D., Fan, W., Kishen, A., Gutmann, J. L., & Fan, B. (2014). Evaluation of the antibacterial efficacy of silver nanoparticles against *Enterococcus faecalis* biofilm. *J Endod, 40*(2), 285-290.

Wu, H., Liu, B., Liu, J., Pan, Y., Yuan, L., & Hu, G. (2012). Phenotypic and molecular characterization of CTX-M-14 extended-spectrum beta-lactamase and plasmid-mediated ACT-like AmpC beta-lactamase produced by *Klebsiella pneumoniae* isolates from chickens in Henan Province, China. *Genetics and Molecular Research, 11*(3), 3357-3364.

Wuithschick, M., Paul, B., Bienert, R., Sarfraz, A., Vainio, U., Sztucki, M., Kraehnert, R., Strasser, P., Rademann, K., & Emmerling, F. (2013). Size-controlled synthesis of colloidal silver nanoparticles based on mechanistic understanding. *Chemistry of Materials, 25*(23), 4679-4689.

Xue, B., He, D., Gao, S., Wang, D., Yokoyama, K., & Wang, L. (2016). Biosynthesis of silver nanoparticles by the fungus *Arthroderma fulvum* and its antifungal activity against genera of *Candida, Aspergillus* and *Fusarium*. *Int J Nanomedicine, 11*, 1899-1906.

Yang, N., & Li, W.-H. (2013). Mango peel extract mediated novel route for synthesis of silver nanoparticles and antibacterial application of silver nanoparticles loaded onto non-woven fabrics. *Industrial Crops and Products, 48*, 81-88.

Yang, Y. (2008). Analysis of Water-soluble Polysaccharides and Protein Contents of Green Tea, Black Tea and Puer Tea [J]. *Journal of Anhui Agricultural Sciences, 29*, 95-101.

Yemoa, A., Gbenou, J., Affolabi, D., Moudachirou, M., Bigot, A., Anagonou, S., Portaels, F., Quetin-Leclercq, J., & Martin, A. (2011). Buruli ulcer: a review of in vitro tests to screen natural products for activity against *Mycobacterium ulcerans*. *Planta medica, 77*(06), 641-646.

Yin, H., Yamamoto, T., Wada, Y., & Yanagida, S. (2004). Large-scale and size-controlled synthesis of silver nanoparticles under microwave irradiation. *Materials chemistry and Physics, 83*(1), 66-70.

Youssef, A. M., & Abdel-Aziz, M. S. (2013). Preparation of polystyrene nanocomposites based on silver nanoparticles using marine bacterium for packaging. *Polymer-Plastics Technology and Engineering, 52*(6), 607-613.

Zainin, N., Lau, K., Zakaria, M., Radu, S., Razis, A., Faizal, A., & Rukayadi, Y. (2013). Antibacterial activity of *Boesenbergia rotunda* (L.) Mansf. A. extract against *Escherichia coli*. *International Food Research Journal, 20*(6), 3319-3323.

Zaki, S., El Kady, M., & Abd-El-Haleem, D. (2011). Biosynthesis and structural characterization of silver nanoparticles from bacterial isolates. *Materials research bulletin, 46*(10), 1571-1576.

Zanette, C., Pelin, M., Crosera, M., Adami, G., Bovenzi, M., Larese, F. F., & Florio, C. (2011). Silver nanoparticles exert a long-lasting antiproliferative effect on human keratinocyte HaCaT cell line. *Toxicology in Vitro, 25*(5), 1053-1060.

Zgurskaya, H. I., López, C. A., & Gnanakaran, S. (2015). Permeability barrier of Gram-negative cell envelopes and approaches to bypass it. *ACS infectious diseases, 1*(11), 512-522.

Zhang, M., Zhang, K., De Gusseme, B., Verstraete, W., & Field, R. (2014). The antibacterial and anti-biofouling performance of biogenic silver nanoparticles by *Lactobacillus fermentum*. *Biofouling, 30*(3), 347-357.

Zhang, X.-F., Liu, Z.-G., Shen, W., & Gurunathan, S. (2016). Silver Nanoparticles: Synthesis, Characterization, Properties, Applications, and Therapeutic Approaches. *Int. J. Mol. Sci., 17*(9), 1534-1567.

Zhao, X., Lin, C. W., Wang, J., & Oh, D. H. (2014). Advances in rapid detection methods for foodborne pathogens. *J Microbiol Biotechnol, 24*(3), 297-312.

Zhu, J., Bai, Y., Wang, Y., Song, X., Cui, S., Xu, H., Jiao, X., & Li, F. (2017). A risk assessment of salmonellosis linked to chicken meals prepared in households of China. *Food Control, 79*, 279-287.

Zhu, J., Liu, S., Palchik, O., Koltypin, Y., & Gedanken, A. (2000). Shape-controlled synthesis of silver nanoparticles by pulse sonoelectrochemical methods. *Langmuir, 16*(16), 6396-6399.

Zielińska, A., Skwarek, E., Zaleska, A., Gazda, M., & Hupka, J. (2009). Preparation of silver nanoparticles with controlled particle size. *Procedia Chemistry, 1*(2), 1560-1566.