Could the Content and Context of the Late Medieval Lelamour Herbal Provide a Source for New Treatments?

In Partial Fulfilment of MRes Medieval Studies, HPMS7002

30/9/21

DECLARATION

This work has not previously been accepted in substance for any degree and is not being concurrently submitted in candidature for any degree.

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Abstract:

This thesis aims to answer the question: Could the content and context of the late medieval *Lelamour Herbal* provide a source for new treatments? Medieval manuscripts can form an important resource for modern medicine, containing remedies with plant or ingredient combinations that have the potential to provide the basis for new drugs. It also aims to challenge the popular impression of medieval medicine as ineffective. The thesis also aims to situate the herbal in its historical context and how this may have impacted the herbal. The focus for this thesis was remedies that appeared likely to contain anti-inflammatory potential, due to the widespread use of anti-inflammatory drugs in treating a wide range of ailments from aches and pains to serious illnesses such as cancer. The remedies selected contained treatments for pain, swelling, tumours, gout, or other indicators of inflammation. The plants in these remedies were then matched to modern scholarship on the anti-inflammatory, antioxidant, or other relevant properties found within the plants. This thesis has shown that the selected remedies of the *Lelamour Herbal* are indeed potential anti-inflammatories, as well as antioxidant, *anti-cancer*, anti-diabetic, anti-Alzheimer's, and anti-dementia due to the properties found within the plants. Therefore, the author argues that research of medicinal medieval manuscripts opens up an avenue of research for new drugs for a variety of issues, and that further research on the remedies found within medieval medicinal manuscripts is needed.

Glossary:

a7nAChR – Alpha-7 nicotinic receptor,

AAN – Aristolochic acid nephropathy; deterioration of the kidneys caused by Aristolochic acid,

Abscess – pocket of bacterial infection,

Abortion – chemical or surgical ending of a pregnancy,

Abrogate – avoid, revoke,

'Accesse' – sudden onset of illness,

Acetylcholinesterase – Enzyme involved in breaking down acetylcholine,

Ach – Acetylcholine,

Ache – muted, dull pain,

a-chymotrypsin – enzyme found in the digestive system,

Active ingredient – The constituent of a drug that produces an effect,

Acupuncture – Traditional Chinese medicinal practice, involving the insertion of needles into various points on the body,

Adipose tissue – body fat,

Adenocarcinoma – Cancer that started in organ glands,

Ailment – sickness, illness

Allergy – immune/inflammatory response to a particular substance,

Alkaloid – naturally occurring chemical class; includes morphine and nicotine,

Alternative medicine – medicinal treatments or systems that are not viewed as 'mainstream',

Alzheimer's disease – type of dementia; disease associated with brain function decline and atrophy,

Analgesic – pain-relieving,

Ancientbiotics – group of universities testing historical remedies,

Anesthetic – substance that blocks the ability to feel pain,

'Aisell' – vinegar,

Angiogenesis – process of growing new blood vessels,

Anglicana (script) – type of medieval handwriting often found in legal documents,

Anglo-saxon – Germanic settlers of Britain; period from c. 500AD to 1066AD,

Animal (virtue) – Psychic, soul,

Anisodamine – anticholinergic antagonist,

Anisodine – anti-spasmodic and anti-cholinergic drug, alkaloid,

Antagonist – chemical or substance that blocks a response,

Anthocyanins – pigment found in plants such as blueberries,

Anthocyanadins – Another form pigment found in plants such as blueberries,

Anthropology – Study of humans,

Anti-allergy – prevents an allergic reaction,

Anti-Alzheimer's – prevents Alzheimer's

Anti-biotic – form of medicine used to kill bacteria i.e. MRSA,

Antibiotic resistance – development of mechanisms that prevent Anti-biotics functioning effectively in bacteria,

Anti-cancer – drugs used to prevent, stop or reduce cancer development,

Anti-convulsant – drugs used to help prevent or reduce convulsions (seizures),

Anticholinergic – drug that blocks the actions of acetylcholine,

Anti-depressant – drugs used to prevent or reduce depression,

Anti-diarrhetic – drugs used to prevent or reduce diarrhoea,

Anti-elastase – drugs that stops the function of elastase,

Anti-emmenagogue – drug used to reduce menstruation,

Anti-feedant – chemicals that stop animal or bugs eating plants,

Anti-fertility – drugs that prevent or reduce fertility,

Anti-fungal – drugs that prevent or reduce the growth of fungi,

Antihelminth – drugs used to rid the body of parasitic worms,

Anti- Hemorrhagic – drugs used to prevent or reduce hemorrhage (heavy bleeding),

Antihepatotoxic – drugs protective of the liver,

Anti-hyaluronidase – acts against enzyme that breaks down hyaluronic acid,

Anti-hyperglycaemic – lowers blood sugar,

Anti-inflammatory – reduces or prevents inflammation,

Anti-leukemic – acts against leukemia,

Anti-lipidemic – lowers blood lipids (fatty acids),

Anti-microbial – acts against microbes,

Anti-mutagenic – reduces or prevents mutagens (i.e x-rays) from damaging DNA in cells,

Anti-platelet – prevents platelets from functions, stops blood clotting,

Antioxidant – acts against oxidants,

Antiproliferative – inhibits cancer cell growth,

Anti-pyretic – reduces fever (febrifuge),

Anti-rheumatic – prevents or reduces rheumatism,

Anti-spasmolytic -prevents or reduces spasms (uncontrolled muscle contractions),

Anti-thrombotic – reduces blood-clotting,

Anti-tumour – prevents or reduces tumour formation,

Antiulcer – prevents or reduces ulcer formation,

Antiviral –acts against viruses,

'Antracas' – carbuncle, severe abscess,

Anxiolytic – prevents or reduces anxiety,

Apigenin – type of flavone; anti-inflammatory, antioxidant etc.,

Apoptosis - process in which human cells die,

Aristolochic acid – Alkaloid known to cause cancer and liver deterioration,

Arthritis – inflammation of the joints,

Aspirin – drug synthesized from Willow bark, Salicylic acid,

Astrology – study of stars, planets and their influence on the world,

Astronomy – study of the universe,

Atherosclerosis – condition that caused arteries to become blocked with fatty deposits,

Atropine – alkaloid found in some plants i.e. Deadly Nightshade,

Autograph – earliest version of a manuscript written by the author,

Autopsy – surgical examination of the deceased,

Ayurveda – Traditional Indian, Hindu medicinal system,

'Aysell' – See 'Aisell',

B cell – Type of white blood cell which produces antibodies (immune cell, lymphocyte),

'baryes'/'Bawes' – Boar,

Bastard Anglicana (script) – another style of Anglicana script,

Benedictine – Monastic group following the Rule of St Benedict,

Bile (Yellow/Black) – digestive fluid produced by the liver,

Bioactivity – effect of a drug,

Biofilm – protective layer produced by bacteria,

Bladder – abdominal organ used to excrete urine,

Blood – liquid found in arteries and veins,

Bloodletting – practice of cutting open a vein or artery to remove blood,

'Boche' – bubo, swelling, tumour,

'Bolwyng' – swelling, inflammation,

Bubo – inflamed lymph node found in the armpit or groin,

CAM – Contemporary and Alternative Medicine

Cancer – disease caused by uncontrolled cell division,

Canon (textual) – collection of texts seen to hold authority,

Carbuncle – severe abscess,

Cardiogenesis – development of the heart within an embryo,

Cardiotonic – drug that improves the condition of heart muscle,

Cardiovascular – relating to heart and blood vessels, the circulatory system,

Carminative – drug that facilitates the promotion of gas,

Cartilage – form of connective tissue,

Carvone - form of terpenoid found in Dill and Caraway,

Catarrh – large amount of mucous build up in nose, throat etc.,

Cautery – practice of burning a wound or body part to prevent bleeding or infection,

Casting (womb) – tossing, menstruating [?]

Cervical – relating to the neck or cervix,

'Chafynge' - odour, bad smell,

Chalcone – biological compound, anti-cancerous,

Chelating (metal) – binding or removal from bloodstream,

Chelidonine – alkaloid found in Celandine and the Poppy family of plants,

Chemokine –form of cytokine, proteins that influence the immune system,

Cramp – muscle contraction often caused by strain or tiredness,

Crohn's disease - inflammatory intestinal disease,

Chlorine – chemical element known for it's strong smell,

Choleric – disposition; irritable, poor-tempered etc.,

Cholinergic – relating to the function of acetylcholine as a neurotransmitter,

'Cleped' – called, named,

Clergy – class of ordained individuals within the church,

Clinical study/trial – experiments designed with specific parameters to assess efficacy and safety of drugs or treatments,

Codeine – analgesic drug made from morphine (opiate),

Colitis – inflammatory disease of the colon lining,

Colon – part of the large intestine that connects to the small intestine,

Compound drug – drug formed from more than one separate drug,

Complement (inhibitors)- inhibitors that bind to targets in order to influence the inflammatory response,

Complexion – an individual's appearance,

Convulsion – uncontrolled muscle contractions,

Cornea – outer layer of the eye.

Coumarin – aromatic compound, ant-inflammatory,

Covid – COVID-19, Sars-Cov-2, Severe Acute Respiratory Syndrome Corona virus,

COX (1 & 2) – Cyclo-oxygenase enzyme pathways (turn arachidonic acid into prostaglandins),

Cutaneous – skin-related,

Cytokine – proteins produce by immune cells like B cells,

Cytokine storm – severe immune reactions, over-producing cytokines,

Cytostatic – substance that reduces or prevents cell growth,

Cytotoxic – substance that kills cells,

Dementia – overarching term for cognitive impairments such as Alzheimer's and Vascular dementia,

Deoppilant – opens blockages,

Derivative – compound made from a similar one through chemical reaction,

Dermatitis – a form of eczema,

Dermatology – study of the skin,

Diabetes – Type 1; High blood sugar caused by the body attracting insulin producing cells. Type 2; the body cannot produce, or react to insulin, causing high blood sugar.

Diagnosis – assessment of medical condition,

Dialect - language, or way of speaking specific to an individual area.

Diclofenac – Nonsteroidal anti-inflammatory drug,

Differentiation (cell) – cell changes from one sort to another,

Disease – a bodily dysfunction that causes certain symptoms, or affects a particular area,

Dissection – surgical study of the body,

Diuretic – drug that increases urination,

DNA – code that contains the genetic instructions of cells in a double helix form,

'Dronke' - drunk,

Dropsy – swelling due to excess water, oedema,

Drug interaction – often negative effect caused by taking two drugs, for example one inhibiting the other,

Dwale – medieval form of anaesthetic,

Dyspepsia – indigestion, heartburn etc.,

Eczema – dry, itch skin condition caused by inflammation,

Ellagic acid – natural antioxidant,

Electuary – medicinal tablet, often made with honey (medieval)

Element(s) – substances viewed as the building blocks of nature, earth, fire, wind, water,

Emmenagogue – drug that increases menstruation,

Empiricism – philosophy that knowledge is gained from experience,

Endotoxic shock – severe inflammatory reaction caused by infection,

Enzyme – substance that aids chemical reaction within the body,

Epicatechin – an antioxidant flavonoid,

Epidermis – outer layer of the skin,

Epidermoid laryngeal carcinoma – cancer developing from the squamous cells of the larynx,

Epilepsy – neurological condition characterized by seizures,

Epithelial – thin tissue layer that covers skin and soft tissues,

'Erbe' – herb,

Esculin – a form of glucoside derived from coumarin,

Extracellular matrix – framework of molecules which support structure and surround cells and tissues,

Expectorant – drug that encourages removal of phlegm or mucous from the airways,

Explicit – final entry found at the end of manuscripts,

Falling Evil – epilepsy,

Febrifuge – drug used to reduce fever,

Feedant – encourages bugs or animals to feed

Fistula – connection between body parts or organs that develops due to infection or intervention,

'Flaunke' – flank, side,

Flavonoid – class of substance which help to regulate cells and oxidation,

'Frenesy' - frenzy,

Frenzy – state of manic behaviour,

Foraging – act of searching for edible resources outdoors,

Fourth Lateran Council (1215) – Papal council gathered in 1215AD with the purpose of organizing reform within the church,

Frontispiece – Page facing the title page of a manuscript or book, containing image or text,

Gallic acid – type of phenolic acid,

Gastrointestinal – relating to digestive organs, from mouth to anus,

Gastroprotective – protective of gastric organs, i.e. stomach,

Gene – section of DNA that carry hereditary traits and information, i.e. eye colour,

Genus – biological ranking,

Glucocorticoid – steroid-based hormone involved in inflammation,

Glutathione peroxidase – enzyme which reduces hydrogen peroxide into water, oxygen, and alcohols,

Glutathione reductase – reduces the oxidized form of Glutathione peroxidase into H_2O_2,

Glycoside – sugar molecule connected with a non-sugar molecule,

Gout – form of arthritis characterized by severe joint swelling,

'Goute' – gout,

H_20_2 - Hydrogen peroxide,

HaCaT – immortalized form of human skin cell used in lab testing,

Haemostatic – reduces or stops blood flow, see anti-hemorrhagic,

Hand(s) – individual(s) identified by handwriting within a manuscript,

Hepatic – involving the liver,

Hepatoprotective – protective of the liver,

Hemolytic – involving the breakdown of red blood cells,

Hemorrhoid(s) – Piles, swollen veins around the anus,

Herbal (manuscript) – Manuscript recording the medical used of plants and other substances,

Herbal medicine – plant based medicinal practice,

Histone deacetylase – form of enzyme influencing DNA structure,

Historical geography – study of past regions or places,

HOCl – hypochlorous acid,

Holistic – philosophical or medicinal system functioning on the belief that everything is connected,

Homeopathy – type of complementary medicine that uses highly diluted active ingredients, based on the idea that like causes like,

Homeostasis – equilibrium within the body,

Hormesis – biological process where the same substance can cause different reactions at different quantities,

Hormone – signaling molecule that regulates specific actions within the body,

Humour – bodily fluids that dictate health; black bile, yellow bile, blood, phlegm,

Hyperoside – Derivative of quercetin,

Hydro-alcoholic extract – soluble parts of a drug gained through dissolution with water and alcohol,

Hyoscyamine – an alkaloid and toxin, found in Deadly Nightshade,

Hypocholesterolemia – Severely low cholesterol in the blood,

Hypo-glycemic – low blood sugar level,

Hypolipidemic – drug used to lower high cholesterol levels,

IBD – Inflammatory Bowel Disease,

Ibuprofen – a nonsteroidal anti-inflammatory drug,

IBS – Inflammatory Bowel Syndrome,

IFN-gamma (γ)– cytokine involved with immunity,

In vitro – tests performed in test tubes, petri dishes etc.,

In vivo – tests performed on cells, animals or humans,

Indomethacin – a nonsteroidal anti-inflammatory drug,

Infection – entry and growth of bacteria or micro-organism within the body triggering a defensive response,

Inferior ventricle – Liver, viscera, abdominal organs,

Inhibitor – Molecule which binds to a target in order to prevent a process or reaction being triggered,

Innate – inherent, natural,

Intracellular – inside cells,

iNOS – inducible nitric oxide synthase,

Insecticide – acts against or kills insects,

Insulin – pancreatic hormone that regulate blood sugar,

Insulitis – pancreatic disease caused by attack from the body's immune cells,

Interleukin(s) – class of cytokines which influence immune response, e.g. IL-1,

Intravenous – inside a vein,

Illness – sickness, disease,

Inflammation – immune response to protect the body from infection or foreign objects,

Inflammatory cascade – inflammatory pathway where immune cells release cytokines to trigger a number of processes,

Immune – resistant, protected,

Immunostimulant – drug or substance that aids or up-regulates the immune system,

Ischemia – restriction of blood flow to a body part, or area,

Ischemic injury – damage caused by restricted blood flow,

Islam – Abrahamic belief system found upon the text of the Qur'an,

Isorhamnetin – flavonoid, derivative of quercetin,

I-TAC – interferon-inducible T cell Alpha chemoattractant,

Kaempferol – an antioxidant, flavonoid,

Keratinocytes – type of skin cell,

Kidney stone – lump formed from urine found in the kidney,

Kinase – a type of enzyme,

Lactation – production of breastmilk,

Lechery – lust, overabundance of sexual desire,

'Lechis' – leech, physician,

Lectin – type of protein that bind to certain sugars,

Leukotriene – inflammatory mediator produced by immune cells (leukocytes),

Linalool – form of terpene,

Lithotomy – removal or destruction of kidney, bladder or urinary stones,

LOX – Lipoxygenase, pathway,

LPS – Lipopolysaccharides, endotoxin,

mAChR – muscarinic acetylcholine receptor,

Macrophage – White blood cell specializing in removing deceased cells, and influencing the immune system,

Malignancy – disease of state caused by cells dividing uncontrollably, see cancer,

MAPK – Mitogen-activated protein kinase, pathway influencing pro-inflammatory cytokines,

'Matrice' – uterus, womb,

Mediastinal abscess – abscess often found after damage to the oesophagus or thorax,

Medical starvation – medically controlled restriction of food,

'Medicyns' – medicines,

Melancholy – sadness or depression, caused by predominance of black bile,

Melanoma – skin cancer,

Mellitus (diabetes) – term associated with diabetes,

Metabolism – bodily processes that allow the human body to function

Metastasis – state where cancer spreads from one part of the body to another,

Methodist sect – rationalist view of medicine,

Middle ventricle – spiritual members, heart, lungs,

Migraine – severe headache characterized by pain, auras, ad light sensitivity,

Mill dust – dust produced from milling flour,

Mitochondria – element of a cell which controls cell functions and energy,

Mitosis – processes were a cell splits into two,

MMP – matrix metalloproteinase, influence proteins degradation and tissue repair,

Molecule – group of atoms bonded together,

Monocyte – type of white blood cell involved in the immune response,

mRNA – strand of ribonucleic acid needed to make a protein,

MRSA – Methicillin-resistant *Staphylococcus aureus*,

Muscarinic – type of acetylcholine receptor, influences by muscarine,

Mutagenicity – ability to cause DNA changes,

Myeloid – bone marrow cell or tissue,

'Mylte' – spleen,

N-BUOH fraction – fraction or extract made with Butanol (alcohol),

Narcotic – drug that numbs or paralyses,

Natural history – study of animals and plants based around observation,

Natural Philosophy – study of nature and the universe,

Natural science – study of the natural word, based on empiricism,

Necrotizing enterocolitis – inflammatory gastrointestinal disease often found in premature infants,

Negative-feedback control – regulatory system where output reduces activity of the system's processes,

Nephritis – severe kidney inflammation,

Nephrotoxicity – decline or damage to the kidneys by toxins,

Nervous system – network within the body made up of nerves,

Neuroblastoma – cancer found in underdeveloped nerve cells,

Neuroendocrine system – interaction between nervous and endocrine systems,

Neuroprotective – protective of the nervous system,

Neurosurgery – surgery on the nervous system,

Neutrophil – type of white blood cell, involved in then immune response,

NF-kB – Nuclear Factor Kappa B (protein); pathway that controls DNA copying, formation of cytokines and cell life,

NHS – National Health Service,

Nitrogen – unreactive gas, chemical element,

Nociception – nervous system's detection of things likely to harm i.e heat,

NOS – nitrous oxide synthase, enzyme involved in inflammation and cell signaling,

NSAID – Non steroidal anti-inflammatory drug,

Oestrogenic – hormone that regulates development of female reproductive system,

Opioid – Drug based on active ingredients extracted from Opium poppy,

Ophthalmology – study of the eyes,

Orthopedic – study of the musculoskeletal system,

Osteoarthritis – arthritis definition characterized by degrading of the bone and cartilage of the joints,

Oxidant – substance that oxidizes other chemicals,

Oxidative stress – accumulation of reactive oxygen species, and thus oxygen which damages cells and tissues,

PAF receptor – platelet-activating factor receptor,

Pain – feeling caused by damage to the body, or illness,

Pancreas – gland located near the stomach which creates digestive enzymes,

Paracetamol – acetaminophen, painkiller and febrifuge,

Parasympathetic nervous system – part of the nervous system that controls bodily functions when resting,

Parkinson's disease – degenerative brain disease characterized by loss of motor function,

Pathogen – bacteria, virus etc.,

Paleography – study of handwriting and manuscript dating,

Pediatrics – study of children's diseases,

Peptic – involving digestion,

Pericarditis – inflammation of tissue found around the heart,

Periodontal – relating to gums and support of the teeth,

Persicarin – a flavonoid,

PGE2 – Prostaglandin E2, inflammatory,

Phagocytosis – process by which phagocytes engulf and excrete bacteria, dead cells etc.,

Pharmacodynamic – study of a drug's effect,

Pharmacology – study of drugs,

Pharmacokinetic – study of an organism's effect on a drug,

Phenol – acidic, toxic substance

Phlebotomy – see bloodletting,

Phlegm - excretion found in the airways, see humour,

Physician – practitioner of medicine,

Plague (Pneumonic/Bubonic) – bacterial disease; Pneumonic involving lung infection; bubonic involving the development of buboes,

Plaster – mixture and/or strip of fabric applied to a wound,

Podagra – gout in the feet,

Polygodial – form of sesquiterpene, anti-inflammatory, anti-allergy etc.,

Polygonolide – antioxidant, anti-inflammatory substance,

Polymath – individual with knowledge across several fields,

Polyphenol – compounds made up of phenols, includes flavonoids,

Potage – stew, thick soup,

Proanthocyanins – Polyphenol, flavonoid,

Proanthocyanadins – polyphenol, flavonoid,

Prognosis – course, forecast of disease progression,

Prokinetic – promotes gastrointestinal movement,

Proliferation – increase, growth,

Pro-oxidant – induces oxidative stress,

Prostaglandin - compounds form from arachidonic acid with hormone-like actions,

Pulmonary – lung-related,

Quercetin – flavonoid, polyphenol, antioxidant,

Quinine – anti-malarial drug,

Radical scavenging – substance that removes unwanted free radicals from the body,

Radium – radioactive element,

Reactive Oxygen Species (ROS) – highly reactive substances formed from oxygen which damage the body,

Recension (herbal) – edited version of a text,

Receptor – cell that responds to a specific stimulus,

Rectal – involving the rectum,

Regimen – course or system of health correction,

Remedy – medical treatment,

Renaissance – Period between fourteenth and sixteenth century that saw a revival of European ideals with Classical influence,

Renal – involving the kidneys,

Resolvin – a type of mediator,

Respiratory – involving the lungs,

Rhinosinusitis – inflammation of the sinuses,

Rutin (rutoside)- a flavonoid, quercetin derivative,

Salve – balm or cream applies to the skin to aid healing,

Sanguineous – relating to blood, courageous temperament

Saponin – chemicals known for their production of soap like foam,

'Scab/be' – eczema, scabies

Scabies – itchy skin condition, possibly modern eczema or dermatitis,

'Schappe' – shape, or female genitalia,

Scopolamine – alkaloid, antimuscarinic,

Secretolytic - breaks down secretions,

Sedative – sleep aid

'Seiþ' – boil, cook,

Seizure – misfiring electrical activity in the brain resulting in abnormal movement, twitching shaking etc.,

'Sekenes' – sickness,

Sepsis – extreme or fatal immune reaction to an infection,

Septic shock – massive drop in blood pressure following infection or sepsis,

Sesquiterpene – class of terpene,

'Shelowe' – emaciated,

Signal transduction – process of transmitting a signal through a cell,

Simple (drug) – drug, often herbal with only one ingredient,

Sjögren's Syndrome – condition that effects body parts that produce fluids,

SOD – Superoxide dismutase, reactive oxygen species,

'Solabill' – loose, unconstipated,

Spasmolytic – drug that reduces or prevents spasm,

Species – group, defining class,

Spirit (virtue) – Heart, arteries, brain, sight,

Spleen – abdominal organ specialising in making and storing blood,

STAT 1 – signaling mediator in immune response,

Statin – drug used to reduce cholesterol,

Stomatitis – oral inflammation,

Subcutaneous – below the skin,

Superior ventricle – Animal members: Brain, skull

Superoxide anion – reactive oxygen species containing superoxide,

Superoxide scavenging – form of antioxidant,

Surgery – healing through physical intervention, removal, repair etc.,

'Surnouris' – superficially healed wounds,

Swelling – reaction, often to infection characterised by accumulation of blood or fluid,

'Swelliþ' – swelling,

Sympathetic nervous system – part of the nervous system that function when the body is active controlling the heart, lungs etc.,

Symptoms – indicator of illness or disease,

Synthetic drugs – manmade drugs,

Systemic – affects body as whole or overall,

T Cell – type of white blood cell, involved in immune response,

Tannin – polyphenolic substance,

Temperament – individual's personality or humoural balance,

Terpene – hydrocarbon-based compounds, anti-inflammatory,

Terpenoid – formed from terpenes, see Linalool,

Therapeutic – healing,

Thyroidectomy – removal of the thyroid, full or partial,

Tracheotomy – practice of making an incision in the trachea to create an airway,

Trolox – antioxidant drug,

Tonic – substance given to increase patient wellness,

TNF-a – Tumour necrosis factor alpha,

TNF-R1 – Tumour necrosis factor receptor 1,

Traumeel - homeopathic drug,

Triterpene – form of terpene,

Ulcer – open sore or lesion that fails to heal,

Urease – enzyme that helps form urea

Urethra – tube through which an individual urinates,

Uricosuric – increase removal of uric acid through urination,

Urolithin – compound found in the gut, made by bacterial processes,

UVB – form of ultraviolet light,

Vagus nerve – nerve that runs from head to abdomen with several branches and functions,

'Vale' – valley,

VEGF - vascular endothelial growth factor, angiogenic,

Vernacular – everyday language,

Virus – infectious agent that replicates inside cells to cause illness,

'Vlake' - lukewarm,

'Vomyte' – vomit,

Vital (virtue) – heart, spiritual,

'Vncomes' – boil,

'Washen' – wash,

White blood cells – type of blood cell that deal primarily in host defence,

Wound – tear, cut, tissue injury,

Wound healing – ability to aid or heal a wound,

Yoga – practice/discipline of postures and stretches aimed at wellbeing,

'þhiesse' – thighs,

Introduction

The *Lelamour Herbal* (LMH) has been chosen as the case study for this thesis. It is a late medieval herbal, written in Middle English and one that has been understudied by modern scholars: prior to Moreno Olalla's edition and commentary, the latest works on the publications on Lelamour are twentieth century. The *Lelamour Herbal* is believed to have been compiled by John Lelamour, as its name suggests, between 1373 and 1377. However, Moreno Olalla provides evidence that the date for the only extant manuscript is in fact 90 years later, and likely a copy of Lelamour's original manuscript.[1] Lelamour's Herbal is based upon several sources both identified and unidentified: known sources of the Herbal include the *Agnus Castus*, Macer's *De Viridus Herbarum*, and 'The Virtues of Rosemary'. It contains references to various stalwarts of the medieval and Classical medical worlds including Pliny, Hippocrates, Galen and Dioscorides, making it an important tool in the study of the transmission of such texts in the Middle Ages. Its linguistic association with the Northern Macer manuscript[2] and textual similarities to the remnants of the Thornton Herbal,[3] also make it a source of knowledge regarding the transmission of Middle English medical texts. Although this herbal has been used in previous research into medieval herbals, its medical and pharmacological value has been largely ignored. This thesis will contribute towards better understanding of the text, medieval medicine and its potential to create new remedies and research avenues for both medieval studies and medical research.[4]

The medical humanities are a growing field, and an important resource at a time where issues such as drug resistance and opioid addictions are gaining prevalence.[5] The medical humanities

[1]London, British Library, Sloane MS 5, ff.13ra-57ra: In: Moreno Ollala. 2018. Lelamour Herbal *(MS Sloane 5, ff. 13r-57r): An Annotated Critical Edition*. Late Medieval English Texts. Peter Lang, Bern. P11-115.
[2] Oxford, Bodleian Library, Additional MS A.106, ff. 244r-259r: In: Moreno Olalla (ed.)*, Lelamour Herbal.* Pp15-20.
[3]G. R. Keiser. 1996. 'Reconstructing Robert Thornton's Herbal.' *Medium Aevum*. Vol. 65. No. 1. Pp35-53.
[4]Moreno Ollala (ed.), *Lelamour Herbal*. Pp11-115.
[5]M. McCarthy. 2019. *Superbugs: The Race to Stop an Epidemic*. Scribe, London.Pp1-290: and: G. C. Dertadian. 2019. *A Fine Line: Painkillers and Pleasure in the Age of Anxiety*. Palgrave Macmillan, Singapore. Pp3-275: And: J. McKinstry, C. Saunders. 2017. 'Medievalism and the medical humanities.' In: *Postmedieval: a journal of*

combine the methodologies and research of the aforementioned disciplines in order to produce new research and insight. Often, this research is aimed at improving modern medicine with new approaches based in historical remedies or methods, and expanding modern concepts of medicine.[6] There is also the rise of new illnesses such as SARS-CoV2 (Covid-19), which will potentially need new drugs to fight it if our current arsenal proves ineffective.[7] Connelly suggests that there are those in both the humanities and medical professions who believe answers to the above issues can be found in working together. [8]

This study aims to look at a sample of remedies from the *Lelamour Herbal* that are potentially anti-inflammatory, establishing those that could be potentially helpful to modern medicine. For example, studies of the recent Covid pandemic suggests that anti-inflammatory drugs may be beneficial in treating the disease.[9] Anti-inflammatories are also used to treat a wide variety of health problems from swelling, headaches and back-ache to cancer treatments. Many anti-inflammatories such as the non-steroidal anti-inflammatory drugs (NSAIDS) Aspirin or ibuprofen, however, have unpleasant side-effects such as a proclivity for causing stomach ulcers and bleeding. Antibiotic resistance is also becoming an increasing issue with the rise of infections caused by bacteria such as MRSA. The high-level use of antibiotics has meant that resistance has developed within bacterial populations meaning they can no longer be treated using the usual drugs. Therefore, infections are

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medieval cultural studies. Vol. 8, No 2. Pp139-146: And: E. Connelly, S. Künzel (eds). 2018. *New Approaches to Disease, Disability and Medicine in Medieval Europe*. Archaeopress Publishing LTD, Oxford. Pp126-140: and: V. Thomas. 2011. Do modern-day medical herbalists have anything to learn from Anglo-Saxon medical writings? In: *Journal of Herbal Medicine I.* Pp42-52.

[6] TORCH Medical Humanities. *Medical Humanities.* N.d. Available from: https://www.torch.ox.ac.uk/medical-humanities [Accessed: 9/9/23]

[7]S, Robertson. 2017. *Natural products and herbal medicines show promise in fight against COVID-19.* https://www.news-medical.net/news/20201117/Natural-products-and-herbal-medicines-show-promise-in-fight-against-COVID-19.aspx [Accessed: 20/9/21]

[8]Connelly, Künzel (eds.), *New Approaches to Disease, Disability and Medicine in Medieval Europe*. Pp2: See also: J. Stebbing, A. Phelan, I. Griffin, C. Tucker, O. Oeschsle, D. Smith, P. Richardson. 2020. 'COVID-19: combining antiviral and anti-inflammatory treatments.' *The Lancet*. Vol. 20. No. 4. Pp400-402: and: Thomas, 'Do modern-day medical herbalists have anything to learn from Anglo-Saxon medical writings?' Pp42-52.

[9]Robertson, 2017: and: Stebbing, Phelan, Griffin, Tucker, Oeschsle, Smith, Richardson, 'COVID-19: combining antiviral and anti-inflammatory treatments.' Pp400-402.

becoming more deadly as treatment options begin to run out and become more toxic to the patient. Thus, historical herbal remedies could provide a new avenue of drugs. [10]

Another point of relevance here is the rising popularity of complementary alternative medicines (CAMs). These are often herbal remedies and treatments, thus the contents of the Lelamour may provide a new source for treatments here. This cultural phenomenon means that there is an appetite for herbal medicines and treatments that are seen as more natural than modern synthesised drugs (including traditional Chinese and Indian medicinal practices such as acupuncture).[11] Both traditional Chinese medicine and Indian Ayurvedic medicine take a more holistic approach to healthcare, both using diet, exercise, and natural remedies in order to keep the body healthy. Much like medieval medicine, treatments are tailored to the individual and their needs and aim to bring the body into balance. Ayurveda has an elemental basis, as does medieval medicine. Traditional Chinese medicine's Qi (life force) is perhaps comparable to the medieval idea of the spirit, moving within the body. Thus, although these are not western medicinal systems, the ideas behind them, at least in terms of historical medicine, are somewhat present in earlier forms of

[10]M. McCarthy. 2019. *Superbugs: The Race to Stop an Epidemic*. Scribe, London.Pp1-290. Pp25-6, 60-71: See also: C. A. Dinarello. 2010. 'Anti-inflammatory Agents: Present and Future.' *Cell*. Vol.140. Pp935-950. See also: V. R. Khayrullina, A. D. Mukhametov, L. A. Tjurina, G. G. Garifullina, A. Y. Gerchikov, P. S. Zarudiy. 2007. 'Nonsteriodal Anti-Inflammatory Drugs: I. A Study of "Structure-Efficacy of the Anti-Inflammatory Effect Relationship Activity'. *Biochemistry (Moscow) Supplement Series B: Biomedical Chemistry,* Vol. 1. No. 4. Pp305-312: A. H. Rahmani, M. A. Alsahli, S. M. Ali, M. A. Khan, Y. H. Aldebasi. 2018. 'Role of Curcumin in Disease Prevention and Treatment.' *Advanced Biomedical Research.* Vol. 7. No. 38. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5852989/. [Accessed: 1/10/20]: and: S. Prasad, B. B. Aggarwal. *Chapter 13: Turmeric, the Golden Spice*. In: Herbal Medicine: Biomolecular and Clinical Aspects. 2nd Edition. I. F. F. Benzie, S. Wachtel-Galor (eds) 2011. CRC Press, Boca Raton. Available from: https://www.ncbi.nl.nih.gov/books/NBK92752/. [Accessed: 15/10/20].

[11] X. Wang, A. Zhang, H. Sun. 2012. 'Future Perspectives of Chinese Medical Formulae: Chinmedomics as Effector.' *OMICS*, Vol 16. No. 7-8. July. Pp414-421: See also: M. Niemi, G. Ståhle. 2012. 'The use of ayurvedic medicine in the context of health promotion – a mixed methods case study of an ayurvedic centre in Sweden.'*BMC Complementary and Alternative Medicine*. Vol. 16. No. 62. Pp1-14. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4756420/ [Accessed: 20/9/21]: Lad. N.d. Ayurveda: A Brief Introduction And Guide. V. Available from: https://www.ayurveda.com/resources/articles/ayurveda-a-brief-introduction-and-guide [Accessed: 20/9/21]: The Editors of the Encyclopedia Britannica. N.d. *Herbal Therapy. In: Traditional Chinese Medicine*. Available from: https://www.britannica.com/science/traditional-Chinese-medicine/Herbal-therapy. [Accessed: 20/9/21]: P. Wu, S. Lin, L. Panny, Y. Chang, C. Lin, Y. Tung, H. Chang. 2021. 'Effect of the Chinese Herbal Medicine SS-1 on a Sjögren's Syndrome-Like Disease in Mice.' *Life*. Vol. 11. No. 6. Pp1-14.

western medicine: the focus is more on bringing the body into balance using food, herbs and lifestyle rather than a mass treatment structure that tends to treat symptoms more than causes. The use of herbs in these systems, particularly traditional Chinese medicine, is becoming the focus of modern science as testing identifies remedies or herbs that have medicinal benefits when tested in a laboratory context. Turmeric, for instance is used in Ayurveda and has been found to be an anti-inflammatory, antimutagenic, antimicrobial, and *anti-cancer*.[12] Studies on the efficacy of Chinese medicine have found an extract from peonies has potential to treat Sjögren's syndrome (where a corrupted immune response prevents production of tears and saliva) through reduction of inflammation.[13] The issue with looking at both these systems from a western perspective is that they do not fit into the symptomatic, mass treatment structure of western medicine, and few studies appropriately designed for western standard have been large scale. In both Ayurvedic and traditional Chinese medicine, there have been issues with contamination, heavy metals, and poor-quality ingredients leading to the effectiveness of these systems from a western perspective to be questioned. In both cases however, there are indications from studies like Wu et al. and F. Ray that indicate least some remedies are effective. However, much like in the case of the *Lelamour Herbal*, more research is needed in order to determine efficacy and safety of any remedies.[14]

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[12]Dinarello, 'Anti-inflammatory Agents: Present and Future.'. Pp935-950. See also: Khayrullina, Mukhametov, Tjurina, Garifullina, Gerchikov, Zarudiy, 'Nonsteroidal Anti-Inflammatory Drugs: I. A Study of "Structure-Efficacy of the Anti-Inflammatory Effect Relationship Activity.' Pp305-312.: Rahmani, Alsahli, Ali, Khan, Aldebasi, 'Role of Curcumin in Disease Prevention and Treatment.' Pp1-9: and: Prasad, Aggarwal, *Chapter 13: Turmeric, the Golden Spice*: In: Benzie, Wachetl-Galor, Herbal Medicine: Biomolecular and Clinical Aspects.

[13]I, Martins. 2018. *Compound from Peony Eases Symptoms in Sjögren's Patients, Large Chinese Trial Finds*. I. Available from: https://sjogrenssyndromenews.com/2018/10/18/chinese-peony-compound-eases-sjogrens-symptoms-trial/ [Accessed: 20/9/21]: and: Wu, Lin, Panny, Chang, Lin, Tung, Chang. 'Effect of the Chinese Herbal Medicine SS-1 on a Sjögren's Syndrome-Like Disease in Mice.' Pp1-14: and: F. Ray. 2021. Chinese Herbal Medicine Found Effective in Preclinical Study. Available from: https://sjogrenssyndromenews.com/2021/07/06/chinese-herbal-medicine-ss-1-boosts-saliva-reduces-inflammation-sjogrens-mouse-model-study/ [Accessed: 20/9/21]

[14]Martins, 2018: and: Wu, Lin, Panny, Chang, Lin, Tung, Chang. 'Effect of the Chinese Herbal Medicine SS-1 on a Sjögren's Syndrome-Like Disease in Mice.' Pp1-14 And: Ray, 2021: and: Moreno Ollala (ed.), *Lelamour Herbal.* Pp11-510.

Alternative or complementary medicine, such as acupuncture and the herbal remedies discussed above, are often seen as entirely separate from 'conventional' medicine. However, complementary and alternative medicine (CAM) is partially integrated into the NHS. Patients can be referred for herbal treatments, homeopathy or other available treatments such as acupuncture. This is thought to happen more frequently where patients feel that either conventional treatments have not been successful or where they would prefer a more holistic, natural approach. Due to the more holistic nature of CAM therapies and lack of clinical testing, the use of herbal therapies for example is controversial from a conventional perspective, and side-effects and drug interaction with conventional medicine present an issue. A study from 2003-4 looked at the use of CAM within the Scottish NHS, due to its increasing popularity and concerns over its efficacy and safety. The study found 60% of Scottish practices prescribed CAM treatments, and that prescriptions for those above the age of 16 had doubled since 2000. Even with efficacy and safety concerns, the alternative treatments surveyed in the study were recognised as a popular alternative. Homeopathic remedies (which use highly diluted ingredients) were particularly prevalent in the study, and treatments varied by age group: *Thuja occidentalis* was prescribed for children with breast-feeding issues, colic, teething and vaccination reaction; *Arnica montana* was prescribed in adults with bruising or menstruation issues; and *Rhus toxicodendron* and *Cuprum metallicum* for joint and muscle complaints in older adults. Although many of these remedies are seen as safe, others are known to have potentially significant side effects, hence the reluctance in conventional medicine (alongside questions over efficacy) to prescribe homeopathic, or other CAM therapies. For example, the herbal remedies St. John's Wort, valerian and cranberry were reported to cause drug interaction with conventionally prescribed drugs.[15]

The above study noted that the majority of CAM users were female, and averaged approximately 48 years of age. The age of patients prescribed herbal remedies rather than

[15]S. Ross, C. R. Simpson. J. S. McLay. 2006. 'Homeopathic and herbal prescribing in general practice in Scotland.' *British Journal of Clinical Pharmacology*. Vol.62. No. 6. Pp647-652.

homeopathic remedies was higher, although the reasons for this were unclear. This may be because homeopathic remedies could be creating a placebo rather than medicinal effect, although conventional medications would argue against this. There was also some concern that a small number of children were being given herbal remedies with unknown efficacy and safety. In adults 4% of the patients prescribed oral herbal remedies experienced drug interactions with prescribed medications, but exact levels are unknown. However, the study notes that the NHS prescribing these remedies contributes a small percentage of the actual usage by patients, and the lack of evidence and the alleged 'unscientific' nature of homeopathy are an issue. This raises questions regarding whether only those remedies producing positive clinical trial evidence should be prescribed. Given the challenges of testing these remedies, the problematic nature of the studies on CAM and inconclusive results, the area of complementary medicine needs further enquiry.[16] This popular interest and clinical doubt are both echoed in a later study of herbal medicines by E. Ernst, who states that despite the popularity of herbal medicine and some positive evidence, the herbal medicines that the public believe are safe can in fact be hazardous.[17] Many modern drugs are based on compounds found in plants that were later synthesized, and herbal remedies are popular around the world. This indicates successful usage. In herbal medicine single ingredients are sometimes seen to be weaker than drugs involving multiple plants. However, drugs containing multiple plants are much more difficult to test for efficacy, compared to synthetic drugs due to the larger number of variables. Ernst suggests some form of standardisation is necessary in order to ensure safety and to make herbal drugs fully identifiable. Standardisation is usually only practiced with a small number of ingredients, which means herbal combinations could present an issue here. The higher number of variables could impact overall efficacy, so clinical trialling as a form of testing would be the preferable alternative. Although clinical trials of a variety of herbal drugs are available, as discussed above, the conclusions are often limited due to the issues surrounding testing herbal compounds

[16]Ross, Simpson, McLay, 'Homeopathic and herbal prescribing in general practice in Scotland,' Pp647-652.
[17]Ernst. 'The efficacy of herbal medicine – an overview.' Pp405-9. Pp405-9.

and poor methodology. However, some such as garlic, echinacea, horse chestnut seed, and peppermint oil have demonstrated positive results in clinical testing.[18] Data for some herbal treatments indicate that they can be effective, and safe for treating some health issues. Legal status in many countries also means that herbal remedies are not as heavily regulated, and therefore the efficacy and safety of these drug are uncertain in comparison to conventional drugs. Ernst therefore recommends to only prescribe treatments with proven efficacy but observes that practitioners should be informed on herbal medicines in order to best advise their patients.[19] The remedies discussed in the latter chapter two of this thesis will also show that testing of herbal remedies can provide promising results but that often more research is needed.

Other traditional systems of medicine have also seen testing to assess efficacy. Traditional Persian medicine which is holistic and based in natural remedies has been surveyed by Hosseinkhani *et al.*. Overall, sixty-five herbs used in the system were identified for wound healing. Forty remedies showed at least one wound healing property (anti-inflammatory, antioxidant, antimicrobial), and ten plants held all the properties assessed in the study.[20] These properties will be seen in the literature on plants identified in the Lelamour entries, in chapter 2; for example, *Aristolochia longa* and *Plantago* major L. appear within the *Lelamour Herbal*.[21] Traditional medicine has already contributed to the development of new drugs globally. Traditional usage may form a good basis for future research, alongside modern testing to discern the mechanisms which enable effective remedies' success would allow new drug development and understanding.[22]

[18]*Ibid.* Pp405-9.
[19]Ernst. 'The efficacy of herbal medicine – an overview.' Pp405-9.
[20]A. Hosseinkhani, M. Falahatzadeh, E. Raoofi, M. M. Zarshenas. 2017. 'An Evidence-Based Review on Wound Healing Herbal Remedies From Reports of Traditional Persian Medicine.' *Journal of Evidence-Based Complementary and Alternative Medicine*. Vol 22. No. 2. Pp334-343.
[21]See Remedy 5, Chapter 2: Also: Moreno Ollala (ed.), Pp187-9, 399-401. Appendix: 6A-L, 69A-L.
[22]Hosseinkhani, Falahatzadeh, Raoofi, Zarshenas, 'An Evidence-Based Review on Wound Healing Herbal Remedies From Reports of Traditional Persian Medicine' Pp334-343.

Foraging for food, as well as medicinal plants is also becoming more popular. There are many modern herbals and traditional or alternative medicine books available such as Alys Fowler's *A Modern Herbal,* which provides both a brief overview of herbal usage through history and an A-Z of common medicinal herbs. The book contains information on growing and tending to herbs, as well as their properties, simple remedies, and toxicity for interested readers.[23] Similarly, Adele Nozedar's *Foraging with Kids,* while less about medicinal plants, still encourages readers to go out, find and use the plants around them. Many of these plants such as burdock, cleavers, plantain, elder, linden (Lime tree), nettles, sorrel and so have traditional or historical uses.[24] Again, there is a movement away from prescribed drugs towards more traditional medicine or foodstuffs that are seen as more natural, and potentially kinder to the body. Therefore, the potential of using Lelamour for drugs from a 'natural' source is attractive, both from popular and clinical viewpoints. Alongside this, it also makes access to basic medicinal ingredients and knowledge far more accessible to the general populace than pharmaceuticals offered at a clinic or surgery.[25]

Natural remedies, historically based or not, may also help us in our treatments of modern problems such as SARS-Covid 19. The Ashwaganda plant for example, has recently been targeted in a study as it may have potential as a treatment for Covid, due to its ability to disrupt the virus binding to cells and infecting them.[26] Several other herbs and herbal medicines have been researched in order to assess their viability in tackling Covid. Echinacea, although it has not yet been

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[23]Fowler, *A Modern Herbal*. Pp4-21.

[24]A. Nozedar. 2018. *Foraging with kids: 52 Wild and Free Edibles to Enjoy with Your Children*. Nourish, London. Pp4-21, 78-80, 85-88, 102-106, 54-59, 199-201, 130-134, 141-143: and: Moreno Ollala (ed.), *Lelamour Herbal*. Pp11-510.

[25]M. Grieve, C.F. Leyel (eds). *A Modern Herbal*. Tiger Books International, London: and: Fowler, *A Modern Herbal*. Pp4-21:and: Nozedar, *Foraging with kids: 52 Wild and Free Edibles to Enjoy with Your Children*: and: N. Purchon, D. J. Clary. 1990. *Herbcraft: The Cultivation and Use of Herbs*. Hodder and Stoughton, Rydalmere: Moreno Ollala (ed.), *Lelamour Herbal*. Pp11-510

[26]Robertson, 2017: and: J. S. Mani, J. B. Johnson, J. C. Steel, D. A. Broszczak, P. M. Neilsen, K. B. Walsh, M. Naiker. 2020. 'Natural product-derived phytochemicals as potential agents against coronaviruses: A review.' *Virus Research.* Vol. 284. July. Pp1-16: See also: I. E. Orhan, F. S. S. Deniz. 2020. 'Natural Products as Potential Leads Against Coronaviruses: Could They be Encouraging Structural Models Against SARS-CoV-2?' *Natural Products and Bioprospecting*. Vol. 10. No. 4. August Pp171-186.

clinically tested, shows some promise as a potential treatment against Covid, due to its antiviral, immunostimulatory and anti-inflammatory effects. However, its release of cytokines (white blood cells), that are beneficial to controlling infection, can also have negative side effects. Too many of these cytokines being released in response to infections can cause damage to bodily tissues. Thus, the combination of the immune response to Covid releasing these cells, and the use of echinacea also promoting their production would need to be carefully tested. This would be necessary in order to ensure that they do not aid Covid in causing a 'cytokine storm' (massive inflammatory reaction), one of Covid's most severe and potentially lethal symptoms. Despite this, its potential in modulating the immune system and killing viruses could prove beneficial, with further testing.[27]

Another example is Cinchona tree, better known for its use in producing the antiviral quinine used to treat malaria. Its recognised antiviral properties make it a good target for a potential Covid treatment; it appears that quinine could work against Covid by preventing it from replicating and translating its DNA in host cells, stopping the infections from growing. In an individual with Covid this creates a beneficial immunostimulatory effect but would not work as a preventative measure, as without the virus present, the same action would suppress the immune system, leaving the individual vulnerable. Potential negative side effects also include allergic reactions, and nephritis. Despite this it could prove useful in fighting Covid.[28]

Another study looked at a number of plants that are known for being used against respiratory infections and examined whether due to this usage, they could be useful in treating Covid. The plants identified in the study were researched in comparison to paracetamol, ibuprofen, and

[27]R. V. Nughraha, H. Ridwansyah, M. Ghozali, A. F. Khairani, N. Atik. 2020. 'Traditional Herbal Medicine Candidates as Complementary Treatments for Covid-19: A Review of Their Mechanisms, Pros and Cons.' *Evidence-Based Complementary and Alternative Medicine*. Vol. 2020. Pp5-6.

[28]D. Silveira, J. M. Prieto-Garcia, F. Boyln, O. Estrada, Y. M. Fonseca-Bazzo, C. M. Jamal. P. O. Magalhães, E. O. Pereira, M. Tomczyk, M. Heinrich. 2020. 'COVID-19: Is There Evidence for the Use of Herbal Medicines as Adjuvant Symptomatic Therapy? '*Frontiers in Pharmacology*. Vol. 11. September. Pp1-44: See also: Nughara, Ridwansyah, Ghozali, Khairani, Atik, 'Traditional Herbal Medicine Candidates as Complementary Treatments for Covid-19: A Review of Their Mechanisms, Pros and Cons.' Pp7-9.

codeine. Five herbs were found to be good potential targets; *Althaea officinalis* (marsh mallow), *Commiphora molmol* (myrrh), *Glycrrhiza glabra* (liquorice), *Hedera helix* (Ivy) and *Sambucus nigra* (Elder). A second promising group was identified, including the aforementioned echinacea, as well as garlic, willow and ginger. Once again, however, not enough research is presently available in order to ensure the efficacy of these plants in relation to Covid.[29]

Recent scientific studies by Ancientbiotics (an interdisciplinary group involving the Universities of Nottingham, Warwick, and Texas) , suggest that some herbal and particularly medieval medicine have testable medicinal effects in a laboratory context.[30] Various herbs and resins found in medieval recipes can now be shown to have proven medicinal benefits: Dragon's Blood resin has a long history of medicinal use for example, and in modern research has been found to be haemostatic, anti-diarrhetic, antiulcer, antimicrobial, antiviral, wound-healing, anti-tumour, anti-inflammatory and antioxidant.[31] The thousands of scientific articles on herbs and their beneficial medical effects can be used in conjunction with medieval sources to assess which remedies may hold efficacy. In modern medicine antibiotics are a difficult field due to the extreme costs of developing antibiotics and the speed at which bacteria can evolve. This combination of factors means that antibiotics are often ineffective within a few years of their release.[32] Research into the thousand-year-old Bald's Leechbook manuscript by the Ancientbiotics team have shown that the eye salve remedy works, meaning there are potential ramifications for modern medicinal treatments stemming from a *medieval* medicine. The interdisciplinary nature of the research also evidenced the use of humanities subjects outside of their traditional arena. The remedy was designed to treat a stye, a bacterial infection on the eyelid, which it does using a combination of garlic, a second *allium* species, wine, Ox gall. These articles formed the basis of the present author's interest on this research, providing the

[29]Silviera, Prieta-Garcia, Boyln, Estrada, Fonesca-Bazzo, Jamal, Magalhães, Pereira, Tomczyk, Heinrich, 'COVID-19: Is There Evidence for the Use of Herbal Medicines as Adjuvant Symptomatic Therapy?' Pp1-44.
[30]Harrison, Roberts, Gabrilska, Rumbaugh, Lee, Diggle, 'A 1000-year-old Antimicrobial Remedy with Antistaphylococcal Activity.'Pp1-7.
[31]Gupta, Bleakley, Gupta, 'Dragon's Blood: Botany, chemistry and therapeutic uses.' Pp361-380.]
[32]McCarthy, Superbugs: The Race to Stop and Epidemic, P25.

idea on which this thesis is founded; if Bald's eye salve works…*what else does?* It is the combination of ingredients, rather than any one individual component that makes the eye salve so effective against antibiotic resistant MRSA? This is something that modern medicines struggle to treat due to bacteria developing resistance to medications increasingly quickly.[33] A study by the University of Texas has confirmed the effectiveness of the remedy in tests on mice. The remedy is effective because it destroys biofilm - a layer which the *Staphyloccus areus* bacteria uses to protect itself - which modern antibiotics struggle to penetrate.[34] More recent publications have proved this further, and have also tested the degree to which each of the remedy's ingredients (garlic, another allium species, wine, ox gall) are necessary to the activity of the overall medicine. The wine and brass pot, in testing did not impact the efficacy overall. However, wine may have been beneficial during the making of the remedy, acting as solvent to help extract the active ingredients. The rest of the ingredients were found to be crucial to the mixture's ability to penetrate the biofilm and kill the MRSA infection (other bacteria were also tested: *Acinetobacter baumannii, Stenotrophomonas maltophilia, Staphylococcus aureus*,*Staphylococcus epidermidis*, *Streptococcus pyogenes, Pseudomonas aeruginosa,* and *Neisseria gonorrhoeae*). Thus, the combination of ingredients, not just each individual one, needs to be seriously considered when testing medieval remedies. In many cases it could be the combination of ingredients, rather than the plant acting alone that create an effective remedy.[35]

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[33]Harrison, Roberts, Gabrilska, Rumbaugh, Lee, Diggle, 'A 1000-year-old Antimicrobial Remedy with Antistaphylococcal Activity.'Pp1-7: And: University of Nottingham. N. d. *AncientBiotics – medieval medicine conquers MRSA superbug.* Available from: https://www.nottingham.ac.uk/research/impact/casestudies/ancientbiotics.aspx [Accessed: 27/9/21]

[34]Medievalists.net. 2020. *Medieval Medicine and Modern Science: An Interview with Freya Harrison*. Available from: https://www.medievalists.net/2015/04/medieval-medicine-and-modern-science-an-interview-with-freya-harrison/. [Accessed: 8/10/2020]: and: Furner-Pardoe, Anonye, Cain, Moat, Ortori, Lee, Barrett, Corre, Harrison, 'Anti-biofilm efficacy of a medieval treatment for bacterial infection requires the combination of multiple ingredients' Pp1-14. Available from: Available from: https://www.nature.com/articles/s41598-020-69273-8 [Accessed: 20/9/21]

[35]Furner-Pardoe, Anonye, Cain, Moat, Ortori, Lee, Barrett, Corre, Harrison, 'Anti-biofilm efficacy of a medieval treatment for bacterial infection requires the combination of multiple ingredients' Pp1-14: See also: Medievalists.net, 2020.

Erin Connelly's study of the use of *Plantago* for infected wounds, from a Middle English translation of Bernard of Gordon's *Lilium medicinae*, is another supportive case study. The 'Lylye of Medicynes' translation contains various treatments and medications for illnesses, dated to 1305. Connelly focused on remedies containing *Plantago*, several species of which are used within the text to treat anything from skin conditions, abscesses, ruptured corneas to kidney stones. Four remedies were researched for cutaneous wounds, and one for mouthwash.[36] A 2014 study Connelly references found that *Plantago major* could be used to combat skin pathogens, effective for cuts, burns and insect stings.[37] Connelly's Pubmed (a free database of medical research)[38] search for supporting sources yielded positive results for *P. major and P. lanceolata* demonstrating wound healing properties and anti-microbial activity.[39] Interestingly, both Fowler's herbal and Nozedar's foraging book both reference plantain as a plant worth using: although Nozedar focuses primarily on edible plants, the medicinal uses of Plantain are acknowledged in a small paragraph due to its usefulness in treating cuts and scrapes due to its anti-inflammatory and anti-bacterial properties.[40]

These studies show that the modern medicinal benefit of some historical medicines can clearly be established. Therefore, this study will follow in a similar vein, examining the herbs and remedies within the *Lelamour Herbal* and comparing them to modern scientific examinations of the same ingredients to assess their potential efficacy. As with the above studies, modern scientific literature will be used to assess the effectiveness of various remedies. Overall, this dissertation will

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[36]Connelly, Künzel (eds.), *New Approaches to Disease, Disability and Medicine in Medieval Europe*, Pp126-140.
[37]S. Nilson, F, Gendron, J. Bellegard, B. McKenna, D. Louie, G. Manson, H. Aphonse. 2014. 'Preliminary scientific investigation of the effectiveness of the medicinal plants *Plantago major* and *Achillea millefolium* against the bacteria *Pseudomonas aeruginosa* and *staphylococcus aureus* in partnership with indigenous elders.' *Global Journal of Research on Medicinal Plants and Indigenous Medicine.* Vol. 3. No.11. Pp402-415. In: Connelly, Künzel (eds.), New Approaches to Disease, Disability and Medicine in Medieval Europe,. Pp126-140. P135.
[38]Pubmed. N. d. *Pubmed Overview*. Available from: https://pubmed.ncbi.nlm.nih.gov/about/ [Accessed:24/9/21]
[39]Connelly, Künzel (eds.), *New Approaches to Disease, Disability and Medicine in Medieval Europe*, Pp126-140.
[40]Nozedar, *Foraging with kids: 52 Wild and Free Edibles to Enjoy with Your Children* Pp102-106: And: Fowler, A Modern Herbal. Pp4-21,22, 24, 217-20.

assess whether Lelamour's remedies may have benefit in a modern (anti-inflammatory) context, and whether medieval medicine still perhaps has a thing or two to teach us.[41]

A consideration of medieval remedies through modern scientific study, does present a potential issue which is the removal of the remedies from their original context. By looking at medieval medicinal efficacy, we risk losing sight of their medieval context and significance. There is a straight-forward solution here: by combining the modern science and medieval medicine, we can further increase knowledge in both disciplines. In terms of medieval studies, knowing whether remedies were effective may help us identify why remedies and authors were repeatedly copied. Usage may not have been purely down to reputation and popularity but could also have been because of efficacy. In the *Lelamour Herbal* this will be assessed through matching modern research to symptoms of inflammation, any relevant annotations made to the remedies, and plant identification within the Herbal and Olalla's commentary. Regarding modern scientific disciplines, studies of medieval manuscripts are opening new research avenues into potential medicinal materials that have been forgotten, overlooked, or ignored due to their position in history. As discussed above (and will be discussed in more detail below) some medieval remedies such as Bald's eye-salve may be far more useful than previously considered and reveal new ways to treat illnesses.[42]

It is worth noting here that in order to satisfy both the medieval and medical disciplines, we need to ensure that we understand and appreciate the creation and use of the manuscript, as well as whether their contents are beneficial. Understanding the context means where possible creating

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[41]Moreno Ollala (ed.), *Lelamour Herbal*. P11-510.

[42]Dr. Black's Medieval Remedies (@WinstonEBlack) Like #medievalmedicine? It's exciting to see my favourite #histmedsubject discussed seriously in @Nature's Scientific Reports: nature.com/articles/s4159... Furner-Pardoe et al.. publish the most detailed analysis yet of the medieval recipe Bald's Eyesalve. But I Have some thoughts: (Thread). Available from: https://twitter.com/WinstonEBlack/status/1288150016608141314?t=LBAEV1vP0TycyzW-_7jb8Q&s=19 [Accessed: 28/7/20]: See Also: Moreno Ollala (ed.), *Lelamour Herbal*. P11-510: and: Furner-Pardoe, Anonye, Cain, Moat, Ortori, Lee, Barrett, Corre, Harrison, 'Anti-biofilm efficacy of a medieval treatment for bacterial infection requires the combination of multiple ingredients' Pp1-14: See also: Medievalists.net, 2020.

a better knowledge of how and why remedies were picked and used, and the impact that has on their efficacy. A better understanding of the contents of the remedies in terms of plant and modern ingredient identification means we can learn more from medical sources regarding their efficacy and assess potential treatments that have perhaps been missed.[43] Chapter 1 of this dissertation discusses the medieval medical context and traditions within which the *Lelamour Herbal* sits, and outlines the herbal itself. Chapter 2 aims to introduce the reader to inflammation, the science behind it, and the anti-inflammatory remedies within the *Lelamour Herbal*. Chapter 3 aims to discuss the themes, patterns and issues uncovered over the course of the research.

Methodology

The basis of this methodology is situating Lelamour in its wider context of medieval medicine and history of the herbal. This will then allow the content and context of the herbal to be discussed in terms of medieval medicine and where possible in connection other related manuscripts (Chapter 1). The contents of the herbal have been broken down in the Appendix, based upon information provided by Moreno Olalla. In doing so this makes assessing the potentially beneficial remedies much easier and make the herbal contents much easier to access. Those remedies that mention treatment for swelling, pain, cancer, gout, or other conditions that could potentially be treated with anti-inflammatories have been separated into a smaller spreadsheet (See Appendix) with a minimum of one article each supporting their potential anti-inflammatory properties. Remedies whose plant identification is problematic such as a number of possible plants have been filtered out. Remedies with more than two possible plants are excluded due to lack of clarity on *which* of the plants would have been used in the specified remedy. Any plants that do not have any clear research available

[43]Harrison, Roberts, Gabrilska, Rumbaugh, Lee, Diggle, 'A 1000-year-old Antimicrobial Remedy with Antistaphylococcal Activity.'. Pp1-7: Connelly, Künzel (eds.), New Approaches to Disease, Disability and Medicine in Medieval Europe, Pp126-140: Moreno Ollala (ed.), *Lelamour Herbal*. Pp9-510.

(unless they are the *second* identified plant of an entry) have also been excluded from discussion. Once the remedies were broken down into the spreadsheet and potential remedies that fit parameters were identified, the next stage was to match medieval remedies to modern scientific scholarship. This was initially done by finding at least one article discussing the relevant properties of the plant in relation to the remedy. If the initial articles were found to be inaccessible then alternative research was found for discussion (See Appendix, and Chapter 2). Ideally between two and six articles have been found for each remedy discussed and any relevant constituent chemicals, as well as their effects will be used to enable identification of potentially useful remedies, and increase understanding of how they work and thus the parameters needed to ascertain the most promising remedies. Those plants whose associated research suggests that they are indeed anti-inflammatory will be discussed further as to how beneficial this research may be (See Chapter 2). Where remedies and scholarship were found to match, this correspondence is then discussed in Chapter two. Those remedies whose sources corroborate with their usage will be indicated as potentially effective. This will then facilitate further research into the practicality, effectiveness, and usage of the Lelamour's remedies as potential drug treatments where possible. If the above shows a positive trend, it suggests a strong argument for looking more closely at medieval medical texts in general, particularly those less extensively researched, and the aims of the study have been achieved. Finally, any themes, patterns and issues discovered in the course of research will also be discussed in order to expand discussion and identify any areas of possible future research. (See Chapter 3).

Context of the Lelamour Herbal: Chapter 1

This chapter aims to examine the medieval medical context and traditions within which the *Lelamour Herbal* sits, and provide a contextual outline of the herbal itself. Western medicine inherited knowledge and traditions from the ancient world, and this was expanded upon by the transmission of Greek texts through Arabic authors.[44] There is a common misconception in the modern era that medieval medicine was less sophisticated and efficacious than its modern equivalent. Osler, in *The Evolution of Modern Medicine* states:

> In medicine the Middle Ages represents a restatement from century to century of the facts and theories of the Greeks modified here and there by Arabian practice. There was, in Francis Bacon's phrase, much iteration, small addition. The schools bowed in humble, slavish submission to Galen and Hippocrates, taking everything from them but their spirit….[45]

This perception of medieval medicine as a separate, inferior model to modern practice persists today in popular culture.[46] Medieval medicine is often seen as weird and strange; for example, the idea of gutting a cat and using the warm carcass as heat to relieve heavy period pains would certainly raise eyebrows today, as would boiling a dog (or baking an owl) in order to cure gout. Another odd sounding remedy for a patient found to be 'moon-mad' was to whip them with a

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[44]Moreno Ollala (ed.), *Lelamour Herbal*.P1-510: and: R. Porter.1999. *The Greatest Benefit to Mankind: A Medical History of Humanity from Antiquity to the Present.* Fontana Press, London. Pp1-134.

[45]W. Osler. 1921. *The Evolution of Modern Medicine: A Series of Lectures Delivered at Yale University on the Siliman Foundation in April, 1913*. Yale University Press, New Haven. P125. In: F. Wallis (ed.). 2010. Medieval Medicine: A Reader. *Readings in Medieval Civilizations and Cultures: XV.* University of Toronto Press, Toronto. P xviii.

[46]BBC Radio 4. 2021. *Eight weird and wonderful medieval remedies for illness*. Available from: https://www.bbc.co.uk/programmes/articles/1x1KfqxfSXdzjtc5WTJhh48/eight-weird-and-wonderful-medieval-remedies-for-illness. [Accessed: 27/9/21]: See also: History Extra. 2018. *Kill or cure? 10 medieval medical practices and their effectiveness*. Available from: https://www.historyextra.com/period/medieval/kill-or-cure-10-medieval-medical-practices-and-their-effectiveness/ [Accessed: 27/9/21]

dolphin skin.[47] There is a lack of recognition for the fact that society and societal values have changed, and therefore medieval medicine seems somewhat alien to us. This draws us towards a slightly more anthropological view, that the body itself has a history, based on culture. This impacts the way that medieval ideas on disease and healing seen in the today.[48] However, this impression of medieval medicine is starting to shift with studies such as that on Bald's Leechbook by Ancientbiotics, and Erin Connelly's on *Plantago.* Added to this is the knowledge that many professions such as surgery owe their development to medieval individuals such as John of Arderne.[49]

Many of the Lelamour's sources come from recognisable names within both Classical and medieval medical history, and natural philosophy; Hippocrates, Galen, Dioscorides, Floridus Macer and so on. The popular view of medieval medicine is that it was ineffective, and often copied blindly. By this logic, although much of Lelamour's work has been edited and copied from earlier sources, this does not necessarily mean that it is ineffective. If any of the remedies within the herbal appear potentially effective, in treating pain, swelling, tumours and so on, this will be discussed in Chapter two. Remedies will be judged as potentially effective if the available research indicates they are indeed identified as being anti-inflammatory, and research suggests that they may be of use to modern medicine. [50]

[47]Mount, *Medieval Medicine; It's Mysteries and Science.* For Boiling a dog, see: P116: Baking an Owl, and moon-madness, P117.
[48]Wallis (ed.) *Medieval Medicine: A Reader*, Pxix: See also: Mount, *Medieval Medicine; It's Mysteries and Science*. Pp116-7.
[49]Harrison, Roberts, Gabrilska, Rumbaugh, Lee, Diggle, 'A 1000-year-old Antimicrobial Remedy with Antistaphylococcal Activity.'Pp1-7. See also: Connelly, Künzel (eds.), New Approaches to Disease, Disability and Medicine in Medieval Europe. Pp126-140: And: J. Pearn. 2012. 'Master John of Arderne (1307-1380): a founder of modern surgery.' *ANZ Journal of Surgery*. Vol. 82. Pp46-51.
[50]Moreno Ollala (ed.), *Lelamour Herbal*. Pp1-510.

Western Medicine

Ancient medicine, beginning with Hippocrates, was the foundation for the growth of later medicinal developments. His development of the concept of humours (which medieval medicine inherited) was central. As was the blending of boundaries between philosophy and natural history, and later religion too. Early medicinal texts covered a broad variety of topics that would today be considered separate disciplines, such as astronomy, astrology, natural history, philosophy and so forth. The basis of Hippocratic medicine was that everything could be explained somehow, and that everything followed universal laws. Unlike some later medicine, explanations through supernatural causes were excluded at this time. One of the strongest elements to be handed down was the idea of the body at equilibrium being healthy, and that any upset to this balance would cause illness and a collection of humours in one area of the body. Upset could be caused by anything from diet to changing seasons. It was this idea alongside humours, that was solidified later under Galen, as will be discussed later.[51]

Hippocrates is often seen as the father of medicine as a discipline and the individual responsible for the Hippocratic Oath. Hippocrates is viewed as having set the foundation of texts for those that followed him in his *Corpus* setting out diagnoses, prognoses, identifications of disease, healing broken bones, diet, paediatrics and more.[52] The *Hippocratic Aphorisms*, a collection of proverbs, rules, and observations, disseminated the idea of medicine as a science. The second part

[51]Porter, *The Greatest Benefit to Mankind: A Medical History of Humanity from Antiquity to the Present*, Pp1-134.

[52]M. North. 2002. *Greek Medicine*. Available from: https://www.nlm.nih.gov/hmd/greek/greek_oath.html. [Accessed: 5/2/21.]and: K. Oxtoby. 2016*. Is the Hippocratic Oath still relevant to practising doctors today?* Available from: https://www.bmj.com/content/355/bmj.i6629. [Accessed: 5/2/21]: and: The Editors of Encyclopaedia Britannica. N.d. *Hippocratic Oath*. Available from: https://www.britannica.com/topic/Hippocratic-oath [Accessed: 5/2/21]

of the commentary provides Hippocratic views on the material of life and the width of the study of medicine.[53]

The influences of Plato (428/427-348/347 BC) and Aristotle (384-322BC) also echo within medieval medicine, with the idea of morality and behaviour being affected by humoural balance and thus treatable via medicine. In the *Lelamour Herbal* there are multiple remedies that have the ability to alter lechery, for example. The Aristotelian ideals of empiricism across all areas he studied combined with Hippocratic teaching, is the basis of early medicine.[54] The polymath Pliny the Elder built on this further, with his work across astrology, historical geography, zoology, medicine and philosophy enabling the placing of Aristotelian medicine in a wider context. Pliny the Elder is known in medicine as the author of *Natural History*. His encyclopaedic work aimed at bringing sources together for easier use was employed from Pliny's time (*Natural History* was finished around 77 CE), through to the Middle Ages and beyond. Pliny's *Natural History* covered everything from astrology, historical geography, and zoology to medicine, providing a valuable source for medieval practitioners, who combined astrology, natural philosophy and science into medicine. Thus, Pliny was a highly influential source for the medieval period's polymath physicians. Much of Pliny's work was based on Aristotle, allowing his ideas to be transmitted.[55]

Roman medicine built upon its predecessor Alexandrian medicine (based around Alexandria). It expanded awareness of medicinal ingredients and materials and developed the idea that arteries

[53]Wallis (ed.) Medieval Medicine: A Reader. Pxix: See also: Mount, Medieval Medicine; It's Mysteries and Science. Pp10-12: See also: N. G. Siraisi. 1990. *Medieval & Early Renaissance Medicine: An Introduction to Knowledge and Practice*. University of Chicago Press, London. P59.
[54]Porter, The Greatest Benefit to Mankind: A Medical History of Humanity from Antiquity to the Present, Pp 1-134. See also: Siraisi, Medieval & Early Renaissance Medicine: An Introduction to Knowledge and Practice, Pp 108-152: And: The Editors of Encyclopaedia Britannica. 2020. Plato: Greek Philosopher. Available from: https://www.britannica.com/topic/philosophy [Accessed: 24/9/21]: and: A. J. P. Kenny. 2021. Aristotle: Greek philosopher. Available from: https://www.britannica.com/biography/Aristotle [Accessed: 24/9/21].
[55]J. Stannard. 2021. Legacy of Pliny the Elder: In: Pliny the Elder: Roman Scholar. Available from: https://www.britannica.com/biography/Pliny-the-Elder/Legacy [Accessed: 20/9/21]

and veins were separate. It also discovered the role of the brain in controlling the nervous system and introduced the idea that it was the brain, not the heart, that held the mind. Roman medicine witnessed the rise of the Methodist sect, which opposed Hippocratic humoural theory. Instead, Methodist thinking operated on corpuscular theory, whereby atoms arranged loosely with pores too widely spaced, allowed disease to creep in. Health was seen as balance between tension and relaxation, meaning that symptom descriptions were all that was needed for treatment, unlike Hippocratic medicine where a patient needed to be seen. However, Hippocratic medicine appears to have prevailed. Authors such as Scribonius Largus (whose writings include the first known use of the Hippocratic Oath), Celsus (25BC-50AD) and Galen all leaned toward Hippocratic medicine. Celsus provides scholars with the first Latin medical works, on health and diet, signs to use for diagnosis, diseases and descriptions of treatments, drugs, and surgical procedures. [56]

From Celsus' foundation arose the rise of one of the most recognisable medical authors, Galen (129-216 BC). Galenic writings became the core of medieval teaching, using philosophy and ethics to promote medicine. Galen's biggest legacy was his crystalisation of Hippocratic teachings on the humours. Fever, for example, was caused by excess yellow bile, black bile or phlegm, accumulating in a body part to the point that it caused excess heat which created the fever. To alleviate this, he recommended the practice of bloodletting, synonymous with the medieval period. Draining excess blood, he believed, allowed the body to cool. Galen's legacy was to employ Hippocratic ideas, placing them within a broader framework influenced by Plato. Over time his works were compiled into what became the Galenic Canon.[57]

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[56]Porter, *The Greatest Benefit to Mankind: A Medical History of Humanity from Antiquity to the Present*, Pp 44-71:and: F. Köckerling, D. Köckerling. C. Lomas. 'Cornelius Celsus – ancient encyclopedist. Surgeon-scientist, or master of surgery?' *Langenbecks Archives of Surgery*. Vol. 389. No. 4. 2013. Pp609-616.

[57]Porter, *The Greatest Benefit to Mankind: A Medical History of Humanity from Antiquity to the Present*, Pp71-90: See also: Siraisi, *Medieval & Early Renaissance Medicine: An Introduction to Knowledge and Practice*, Pp 108—9, 120, 128, 135,137, 145-6: And: V. Nutton. 2021. *Galen: Greek Physician.* Available from: https://www.britannica.com/biography/Galen [Accessed: 24/9/21]

Dioscorides' (40-90AD) *De Materia Medica* was popular for much of the Middle Ages, and one of the larger medical texts available to practitioners. Dioscorides was another Classical stalwart influencing medieval thinking, having lain down theory and practice for those who followed. Dioscorides provides information on hundreds of plants and their properties and their uses. This provided a base of simple drugs which practitioners could use in their work. *De Materia Medica* was considered to be one of the primary pharmacological texts in the West from its appearance circa 50AD, until the Fifteenth Century. Therefore, along with Hippocrates and Galen, it is one of the most influential texts on medieval medicine.[58]

Medieval Authors

The above authors were highly influential over later writers and the compilation of medical texts gradually began to expand under authors such as Cassiodorrus and Isidore of Seville. The content of compilations, however, stagnated. Classical authors were disseminated through works such as Isidore's *Etymologies* but were not necessarily expanded. Isidore's works acted as a tool to teach the groundings of earlier authors on the elements, humours, diet, regimen drugs and so on.[59] In Anglo-Saxon England, however, the vernacular language became a transmission tool for medical knowledge. Bald's Leechbook took Latin remedies and edited them to use local ingredients (as in the *Lelamour Herbal*, there are few exotic ingredients).[60]

Pseudo-Apuleius is the name given to an unknown fourth-century author of the *Herbarium Apuleii Platonici* (or *Pseudo-Apuleius Herbarius*). The text was designed to appear as if it was written by Apuleius of Madura, a Roman author (124-170CE). Beyond this, the author's identity and

[58]The Editors of Encyclopaedia Britannica. N.d. *Pedanius Dioscorides, Greek Physician*. Available from: https://www.britannica.com/biography/Pedanius-Dioscorides. [Accessed: 5/2/21].
[59]Porter, *The Greatest Benefit to Mankind: A Medical History of Humanity from Antiquity to the Present*, Pp 89-91.
[60]*Ibid.* Pp91-2

background is unknown. The herbal itself was popular in the medieval period, despite its author's invisibility. [61]

Alexander of Tralles (sixth century) combined his practical experience and theories, particularly in the areas of pharmacology and natural remedies. His work was influenced by Hippocratic and Galenic medicine, although much like later Rhazes (discussed below), did not always agree with Galen. His best-known work is *Therapeutics*, which follows the traditional head to toe format and contains both diagnoses and treatments. Alexander's works were believed to have begun circulating in Latin around 700AD and are known for their focus on practical observation theory. His works also suggests some early signs of clinical testing; in *Therapeutics* he recommend Hyssop for epilepsy in children and suggests that it prevents seizures for long periods of time, meaning that he was repeatedly checking in on those he treated, after treating them. For another ailment, again using Hyssop he provides a recipe, the effects of which he compares against other remedies much like we would with a control in testing today.[62]

Isidore of Seville's (d. 636) most influential work was *Etymologies* (or *The Origins*), an encyclopaedic work, often seen as incoherent due to the author's old age. However, it is valuable in that it preserved and disseminated large amounts learning appropriate for a Christian audience. Wallace also suggests that the structure of the work echoes Alexandrian medical curriculum: Hippocrates *Aphorisms, Prognosis, and Regimen in Acute Diseases*, and then Galen's *On Sects, Art of Medicine, Pulses, and Therapeutics*.[63]

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[61]Siraisi, *Medieval & Early Renaissance Medicine: An Introduction to Knowledge and Practice*, Pp 6, 10: Figure; 8, 31, 36: M. Collins. 2000. *Medieval Herbals: The Illustrative Traditions*. The British Library Studies in Medieval Culture. British Library, London. P165-220.

[62]P. Bouras-vallianatos. 2014. 'Clinical Experience in Late Antiquity: Alexander of Tralles and the Therapy of Epilepsy.' *Medieval History*. Vol. 58, no. 3. July. Pp337-353: See also: Wallis (ed.) *Medieval Medicine: A Reader*, Pxix: See also: Mount, *Medieval Medicine; It's Mysteries and Science.* P23.

[63]Wallis (ed.) *Medieval Medicine: A Reader*, Pxix: See also: Mount, *Medieval Medicine; It's Mysteries and Science.* P1,5, 15, 23: and: Porter, *The Greatest Benefit to Mankind: A Medical History of Humanity from Antiquity to the Present,* P91: and: Siraisi, *Medieval & Early Renaissance Medicine: An Introduction to Knowledge and Practice*, P7.

The Bald's Leechbook gains its name from its commissioner, Bald. The scribe is named as Cild, he was writing around 950. This makes this works the oldest vernacular medieval medical text. It is split into two parts on external disease, and a third on internal diseases. It relies on Mediterranean sources such as the aforementioned Alexander of Tralles, edited to fit the British climate, with a Classical head to toe order.[64] The Leechbook has been studied to assess its efficacy; the eye salve has been tested by the Ancientbiotics team and found to be effective against MRSA and a number of other bacteria.[65]

The following list of authors provides for the textual background within which the *Lelamour Herbal* sits: Gilbertus Anglicus (1180-1250 AD) was a university educated, late medieval physician, politician, and clergy member, and the author of one of the longest medical works of the Middle Ages, the *Compendium medicinae,* which covered medicinal theory, practice, and Islamic teachings. Gilbert's herbal is believed to be one of the earliest western works of the medieval period using eastern knowledge. The original Latin text was translated by 1400 into middle English, increasing its popularity and accessibility. [66]

Guy de Chauliac (c. 1300-1368 AD) was arguably the most prominent surgeon of the Middle Ages, although he also trained as a physician (at Bologna and Montpelier universities). His work, the *Chirurgia magna* became a standard source for surgery. He also served three Popes, including Clement VI, and is the first individual to acknowledge the differences between pneumonic and

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[64]Wallis (ed.) *Medieval Medicine: A Reader*, Pxix: See also: Mount, *Medieval Medicine; It's Mysteries and Science* P119.

[65]British Library. N.d *Bald's Leechbook*. Available from: https://www.bl.uk/collection-items/balds-leechbook# [Accessed: 20/09/21]: See also: F. Harrison, A. E. L. Roberts, R. Gabrilska, K. P. Rumbaugh, C. Lee, S. P. Diggle. 2015. 'A 1000-year-old Antimicrobial Remedy with Antistaphylococcal Activity.' mBio Vol 6. No. 4. Pp1-7. Available from: https://pubmed.ncbi.nlm.nih.gov/26265721/ [Accessed: 1/10/20]: And: Porter, *The Greatest Benefit to Mankind: A Medical History of Humanity from Antiquity to the Present*, Pp 91-2: and: Furner-Pardoe, Anonye, Cain, Moat, Ortori, Lee, Barrett, Corre, Harrison, 'Anti-biofilm efficacy of a medieval treatment for bacterial infection requires the combination of multiple ingredients' Pp1-14: See also: Medievalists.net, 2020.

[66]J. Pearn. 2013. 'Two medieval doctors: Gilbertus Anglicus (c1180-c1250_ and John of Gaddesden (1280-1361).' *Journal of Medical Biography.* Vol. 21. Pp3-7. See also: F. M. Getz. 1992. 'The Pharmaceutical Writings of Gilbertus Anglicus.' *Pharmacy in History*. Vol. 34. No. 1. Pp17-25: And: DLMBS. N.d. *Gilbertus Anglicus, Compendium Medicinae*. Available from: http://www.dmlbs.ox.ac.uk/web/gilbertus-anglicus-compendium-medicinae.html [Accessed: 20/9/21]

bubonic plague. Guy recorded the impact of the plagues, the features and effects they had, alongside their social impact. The information he recorded on the plagues further amplified his reputation. [67]

John of Gaddesden (1280-1361 AD) was a physician, educated in Oxford and was a Master of Arts, Doctor of Medicine and Bachelor of Theology. His medicinal textbook the *Rosa Anglicana Practica Medicinae a Capite a Pedes* was popular with in medieval educational institutions. The work covered well-known authors, both European and Arabic, combined with his own experience. He also covered astrological medical knowledge and magical charm usage.[68]

Macer Floridus is believed to be the pseudonym of Odo de Meung (11th century). His use of 'Macer' is understood to be a reference to the Roman author Aemilius Macer (16BC). The *De viribus herbarum* written by Macer Floridus was popular during the Middle Ages. Written in verse, its format patterns were designed to help readers remember its contents. The work is also seen as a signal of renewed interest in the use of plants for medicinal use, and cites sources such as Pliny the Elder, Dioscorides, Galen and Walahfrid Strabo.[69]

Mattheus Platearius (Twelfth Century) was the author of the herbal *Circa instans*. Platearius belonged to the school of Salerno. The *Circa instans* was a highly popular text and survives in over 200 manuscripts, many of which are in vernacular languages, showing the breadth of the

[67]The Editors of Encyclopaedia Britannica. 2021. *Guy de Chauliac*. Available from: https://www.britannica.com/biography/Guy-de-Chauliac [Accessed: 20/9/21]: And: J. Barr, W. O. Schalick III, C. K. Shortell. 2020. 'Surgeons in the time of plague: Guy de Chauliac in fourteenth-century France.' *Journal of Vascular Surgery Cases and Innovative Techniques.* Vol. 6. No. 4. Pp657-658. And Porter, The Greatest Benefit to Mankind: A Medical History of Humanity from Antiquity to the Present, Pp 116-8.
[68]Pearn, 'Two medieval doctors: Gilbertus Anglicus (c1180-c1250) and John of Gaddesden (1280-1361).' Pp3-7.
[69] Hunt Institute for Botanical Documentation. N. d. *Persons, Collections and Topics: Macer Floridus, pseud. [Odo de Meung/Odo Magdunensis], 11th century*. Available from: https://www.huntbotanical.org/archives/detail.php?95. [Accessed: 5/2/21]: See also: Moreno Ollala (ed.), *Lelamour Herbal*. Pp13-18, 124, 219, 466: Collins, *Medieval Herbals: The Illustrative Traditions*, P284.

document's appeal. Its alphabetic construction makes it user-friendly and covers only properties and explanations useful for healing; it excludes aspects such as astrology.[70]

John of Arderne (1307-1380 AD) was the first English surgeon whose work survives, and he is often regarded as one of the fathers of modern surgery. His experience as a military surgeon formed the basis of his work. His works rivalled Gilbert Anglicus and John of Gaddesden. Arderne's work *Practica* was the culmination of 50 years' work and covered some challenging treatments such as healing fistulas. Following the Hippocratic tradition, Arderne would not operate on patients who were incurable.[71]

The above discussion and list of authors shows the literary context in which the *Lelamour Herbal* sits, from ancient authors to contemporaries. These were the works that it is possible Lelamour may have had access to and read within his lifetime from Hippocrates to John of Arderne.[72]

[70]Collins, *Medieval Herbals: The Illustrative Traditions*, Pp239, 243, 284-7,298, 307, 308. See also: Ventura. 2017. 'A medieval medical bestseller: the 'Circa instans'. Available from: https://wayback.archive-it.org/16107/20210312170336/http://blog.wellcomelibrary.org/2017/02/a-medieval-medical-bestseller-the-circa-instans/ [Accessed: 20/9/21]: And: British Library. N. d. *Mattheus Platearius, Circa instans*. Available from: https://www.bl.uk/collection-items/full-page-miniatures-of-an-apothecary-shop-from-mattheus-platearius-circa-instans [Accessed: 20/9/21].

[71]Pearn, 'Master John of Arderne (1307-1380): a founder of modern surgery.' Pp46-51. See also: Porter, *The Greatest Benefit to Mankind: A Medical History of Humanity from Antiquity to the Present*, P116.

[72]Moreno Ollala (ed.), *Lelamour Herbal*. Pp1-510: And: Wallis (ed.) *Medieval Medicine: A Reader*, Pxix: See also: Mount, *Medieval Medicine; It's Mysteries and Science*, Pp10-12: See also: Siraisi*, Medieval & Early Renaissance Medicine: An Introduction to Knowledge and Practice*, P59: and Pearn, 'Master John of Arderne (1307-1380): a founder of modern surgery.' Pp46-51.

Medical Learning

Medieval medicine was generally perceived as being split into two fields; academics (physicians), and practical professionals (surgeons, midwives). These two forms of medicine conflicted, with physicians' polymath academic learning earning higher status than those who followed the empirical professions such as surgery. [73] The two disciplines were always somewhat separate, but began to diverge further with the Papal edict of the Fourth Lateran Council in1215 which forbade physicians (and clergy) from performing surgery. Contact with bodily fluids was believed to be a form of contamination.[74] Surgery did inform academic practice, however, and the different professions were recognised by the thirteenth century, as seen in Pietro D'Albano's *Consiliator of Difference*.[75] In 1241, Emperor Frederick II allowed dissection within Salerno's university, and in Bologna dissection appears to have begun for autopsies needed in legal cases.[76] Mondino de Luizzi's *Anatomy* of 1316 was created through the study of executed criminals, and similar practices have been recorded in Montpelier.[77] John of Arderne, an English surgeon, was known for his practical work as well as his challenges of Galenic thought and that of other renowned authors. He was also known for his advocacy of individual clinical experience. His clinical practice, military and civilian knowledge and writing earned him considerable recognition.[78] Physicians would use methods such as phlebotomy (bloodletting) and cautery but anything more invasive would be down to surgeons. Pietro D'Albano did not like using astronomical methods to determine whether a patient would survive an illness, believing it led him away from Natural Philosophy and thus from treating the patient and he doubted the method's efficiency. In some cases, physicians would not even need to see the patient: descriptions of symptoms or urine samples were sufficient as it was

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[73]J. Hartnell. 2019. *Medieval Bodies: Life, Death and Art in the Middle Ages.* Profile Books, London. P21.
[74]C. E. Bagwell. "Respectful Image": Revenge of the Barber Surgeon.' *Annals of Surgery*. Vol. 241. No. 6. June. 2005. Pp872-878: See also Pearn, 'Master John of Arderne (1307-1380): a founder of modern surgery.' Pp49.
[75]Siraisi, *Medieval & Early Renaissance Medicine: An Introduction to Knowledge and Practice*, Pp22, 60-68, 96, 110-1, 127- 140, 153.
[76]*Ibid.* Pp86-97.
[77]*Ibid.*Pp78, 86, 90-91, 96, 108-9.
Pearn, 'Master John of Arderne (1307-1380): a founder of modern surgery.' Pp46-51.

believed that its smell, taste and colour were caused by excess humours, and thus diagnosable. The use of urine in physician's arsenal of treatment became synonymous with the role, so much so that urine flasks were used as an identifying symbol for physicians.[79]

Centres of learning were also important in the transmission of ideas. Salerno was one of the medieval period's most well-known medical centres and acted as a key melting pot of information from the Western and Eastern worlds. Its access and proximity to Arabic-speaking localities and Greece, alongside its Benedictine monasteries, meant that knowledge from Arabic translations of Galenic medicine became part of the core of its teachings and subsequently spread throughout academic medicine.[80]

Montpelier, Padua and Bologna universities arose from the expansion of information from centres such as Salerno. Montpelier was home to 'New Galen', the second wave of Galenic translations which amalgamated Galen with Avicenna's *Canon* solidifying Galenic theories.[81] We see the influence of academic leaning in the explicit of the *Lelamour Herbal* where Lelamour refers to himself as the Schoolmaster of Hereford Cathedral which was known for its specialisation in the natural sciences.[82]

Wallis acknowledges that medieval medicinal information can be viewed as somewhat fragmented. Medieval medicine was split into theory (i.e Classical and university teachings) and practical medical literature such as literature from John of Arderne.[83] University medicine has provided us with many of our sources of Hippocratic and Galenic medicine, including the

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[79]Siraisi, *Medieval & Early Renaissance Medicine: An Introduction to Knowledge and Practice*, Pp 79-130, 136, 137, 147-52.

[80]Siraisi, *Medieval & Early Renaissance Medicine: An Introduction to Knowledge and Practice*,Pp 13 -55,86, 116, 124: See also: Hartnell. *Medieval Bodies: Life, Death and Art in the Middle Ages*. P18.

[81]Wallis (ed.) Medieval Medicine: A Reader, Pxix: See also: Mount, Medieval Medicine; It's Mysteries and Science, P195: and: Siraisi, Medieval & Early Renaissance Medicine: An Introduction to Knowledge and Practice, Pp44-59.

[82]Moreno Ollala (ed.), *Lelamour Herbal*. Pp13-16.

[83]Wallis (ed.), Medieval Medicine: A Reader, Pxix: See also: Mount, Medieval Medicine; It's Mysteries and Science, P3: See also Pearn, 'Master John of Arderne (1307-1380): a founder of modern surgery.' Pp46-51.

Hippocrate's *Aphorisms,* Galen's *On Sect's for Beginners* and Isidore of Seville's *Etymologies.* These texts covered anatomy, physiology, diseases the causes, diagnosis, fevers, preventative medicine, and therapeutics. Many have extant commentaries helping us to establish the dissemination and development of ideas on Galenic medicine throughout the period as previously discussed.[84] Cathedrals such as Laon and Chartres appeared to act as access for Mediterranean authors' work, such as Alexander of Tralles, to be disseminated into Europe.[85] Hereford Cathedral may have been a similar center: it certainly would have had a well provisioned library which Lelamour, as schoolmaster would have had access to. This somewhat echoes the idea that Lelamour may have been the Schoolmaster of Hereford Cathedral as his knowledge of philosophy and medical texts would have required a well-provisioned library.[86]

Eastern influences, and their movement West

One of the biggest influences on the development of western medicine in the medieval period was Islam. Authors like Ibn Sinna, al-Razi, and Abu-al Qasim were introduced. Islamic medicine expanded, particularly from the ninth century onwards under the Abbasid caliphate, as scholars began translating non-Arabic texts. Many Galenic translations can be attributed to this movement. In the eleventh century Arabic and Islamic medicine gained momentum again, but this time with more works based on earlier translations. In this period, works by Hunayn (Johannitus), al-Razi, and ibn Sina emerged.[87] Al-Razi, as previously mentioned, introduced the beginnings of clinical trialling, and

[84]*Ibid*.P3, and: Siraisi, Medieval & Early Renaissance Medicine: An Introduction to Knowledge and Practice, Pp71-2.
[85]*Ibid.* P111.
[86]Moreno Ollala (ed.), *Lelamour Herbal*. P14.
[87]Porter, The Greatest Benefit to Mankind: A Medical History of Humanity from Antiquity to the Present, P106: See also Siraisi, Medieval & Early Renaissance Medicine: An Introduction to Knowledge and Practice, Pp 12-59, 140,142-3.

ibn Sinna contributed his two major encyclopaedic works.[88] Ibn Rushd (Averroes), produced commentaries on Aristotle, and Ibn Zuhr (Avenzoar) worked on specific diseases. Arabic and Islamic output and the increasing knowledge of pharmacological ingredients from these sources, allowed the field of medicine to progress, and as this information moved West into the developing early universities, forming medieval medicine into something Lelamour would have recognised.[89]

The medieval West was behind the Islamic world in medical development until the eleventh century. In the foundations of the early universities, the balance began to tip towards the West. Alphanus, Archbishop of Salerno, had travelled widely and was familiar with Greek medical texts. His translations and texts, based on Greek medical literature, began the transmission of Greek Galenic texts edited for a Christian audience.[90] Under the influence of Constantinus Africanus (d. 1085-98), Salerno also introduced Arabic and Islamic ideas into the West. Constantinus translated and disseminated work based on authors such as Haly Abbas, and Johannitus. Arabic medicine and translations of Greek sources that came with it, became part of the foundation of medical learning from the Twelfth Century onwards, under the influence of Monte Cassino and Salerno. The *Isagogue* of Hunayn inb Ishaq, for example, became a standard textbook. [91] This mix of Hippocratic and Galenic medicine, Islamic interpretation and western teaching formed the basis of later medicine. The translations also allowed contemporary ideas to be transmitted, and gradually this mix became part of the grounding of western university teaching in texts such as the *Articella, Liber Ysagogarum,*

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[88]L. M. A. Cambra. 2016. 'The Editions and The Translations of Avicenna's Canon of Medicine.' *Journal of Advances in Humanities.* Vol. 4. Pp423-430: And: The editors of Encyclopaedia Britannica. 2018. *Kitāb al-shifā*. Available from: https://www.britannica.com/topic/Kitab-al-shifa. [Accessed: 25/9/21]

[89]Porter, *The Greatest Benefit to Mankind: A Medical History of Humanity from Antiquity to the Present*, P106: See also: Siraisi, *Medieval & Early Renaissance Medicine: An Introduction to Knowledge and Practice*, Pp12-59, 140,142-3.

[90]Porter, *The Greatest Benefit to Mankind: A Medical History of Humanity from Antiquity to the Present*. Pp93-109: See also: Siraisi. *Medieval & Early Renaissance Medicine: An Introduction to Knowledge and Practice*. Pp12-59, 140,142-3.

[91]Wallis (ed.) *Medieval Medicine: A Reader*, Pxix: See also: Mount, *Medieval Medicine; It's Mysteries and Science,* Pp135-9.

Regimen sanitates salernitatum ('Salernitan Regime of Health'), Hippocrates' *Aphorisms, Prognostic, On Regimen in Acute Diseases* and Galen's *Tegni*. The *Articella* synthesised information fully, containing translations of both Greek and Arabic, provided theory and philosophy thematically and discussed medicine within a wider context. Unlike many preceding texts, it featured Galen alone, rather than Galen in combination with Hippocrates.[92]

Following the advent of universities, there were several waves of translations, from the mid-1100s Latin translations of texts from Muslim Spain, with some Hebrew texts being introduced to the West. This can be seen in the influx Gerard of Cremona's twelfth-century translations of authors such as Avicenna, Rhazes, Galen and Haly Rodoan (Ali-ibn Ridwan). Later, Avicenna's Canon became central to Montpelier's teaching corpus.[93]

The following list of authors aims to provide examples of influential Eastern scholars. Hunayn Ibn Ishaq (Johannitius (808-873) is best known for his translations of some of the greatest ancient philosophers: Plato, Aristotle, Galen, and Hippocrates. His efforts enabled the Arabic, and later the Western world, access to major Greek works such as his *Introduction to the Art of Galen*.[94] Johannitius' treatises on ophthalmology were translated twice by Demetrius and Constantinus Africanus, and his ophthalmology compilation is believed to be the earliest in the middle east, as was his work on dentistry, the *Discourse on the Protection of Teeth.* The physician also gained considerable repute through his position as a private physician to Calip al-Mutawakkil.[95]

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[92]Porter, *The Greatest Benefit to Mankind: A Medical History of Humanity from Antiquity to the Present*, Pp 93-109: See also: Siraisi, *Medieval & Early Renaissance Medicine: An Introduction to Knowledge and Practice*. Pp12-59, 140,142-3.

[93]Porter*, The Greatest Benefit to Mankind: A Medical History of Humanity from Antiquity to the Present*, Pp 93-109*.* Pp113-120: See also: Siraisi, *Medieval & Early Renaissance Medicine: An Introduction to Knowledge and Practice*, Pp12-59, 140,142-3, 188.

[94]The Editors of Encyclopaedia Britannica. 2021. *Hunayn ibn Isḥāq, Arab Scholar*. Available from: www.britannica.com/biography/Hunayn-ibn-Ishaq. [Accessed: 5/2/21]: See also: S. Sadeghi, F. Ghaffari, M. Alizadeh. 2021. 'Al-Masā'il fī al-tbb: Ḥunain ibn Isḥāq's historic medical text with a distinctive style of Islamic medical education.' *Journal of Medical Biography*. Vol. 29. No. 1. Pp29-34.

[95]B. Dalfardi, B. Daneshfard, G. S. M. Nezhad. 2016. 'Johannitius (809-873 AD), a medieval physician, translator and author.' *Journal of Medical Biography*. Vol. 24. No. 11. Pp328-30.

Al-Razi (Rhazes: 865-925 CE) was an early Persian physician, seen as a prominent within Early Islamic science. He is known largely for his works *The Book on Medicine Dedicated to al-Mansur* and *The Comprehensive book on Medicine* (also known as 'The Virtuous Life'), both of which became influential in western universities, and one of the most widely read medical sources of the medieval period. Rhazes is considered one of the early proponents of clinical trailing, with his works recommending using controls groups in research, as a comparison against those being treated. Rhazes also critiqued not only Aristotle and Plato, but Galen's observations too, despite his respect for their work. Rhazes disseminated Classical work whilst updating it with his own observations.[96]

Ibn Sina (Avicenna: 980-1037 CE) was a successor to al-Rhazi and is commonly cited in medieval works. His best-known works are the *Book of Healing* and *The Canon of Medicine,* in which he combines much like al-Rhazi, the works of Galen with Aristotle. *The Canon* became one of the medical authorities throughout the medieval period, and was absorbed into university teaching corpuses at Salerno, Padua, Montpelier, and Bologna.[97] Avicenna's works were expanded upon by Gentile of Foligno, from the University of Bologna, considered 'the soul of Avicenna'.[98] His work on Avicenna brought Aristotelian influence on medicine to the fore, and with it the argument over whether medicine was art or science. Hippocrates and Galen saw it as art (*ars*) whereas Aristotle saw it as science (*sciencia*), thus questioning whether it was a combination of the two. Avicenna, as physician *and* philosopher agreed with Aristotle.[99]

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[96]H. Edriss, B. N. Rosales, C. Nugent, C. Conrad, K. Nugent. 2017. 'Islamic medicine in the Middle Ages.' *The American Journal of the Medical Sciences.* Vol. 345. No. 3. P223-229. See also: Siraisi, *Medieval & Early Renaissance Medicine: An Introduction to Knowledge and Practice*, P133.

[97]Edriss, Rosales, Nugent, Conrad, Nugent, 'Islamic medicine in the Middle Ages.' Pp226-227; And: S. Mahdizadeh, M. K. Ghadiri, A. Gorji. 2015. 'Avicenna's Canon of Medicine: a review of analgesics and anti-inflammatory substances.' *Avicenna Journal of Phytomedicine*. Vol. 5, No. 3, (May-June). Pp182-202: and: Siraisi, *Medieval & Early Renaissance Medicine: An Introduction to Knowledge and Practice*. Pp62, 73-7.

[98]F. Wallis (ed.). 2010. *Medieval Medicine: A Reader*. Readings in Medieval Civilizations and Cultures: XV. University of Toronto Press, Toronto. Pp205.

[99]Wallis (ed.) Medieval Medicine: A Reader, Pxix: See also: Mount, Medieval Medicine; It's Mysteries and Science, P205.

Al-Nabati and his student Ibn al-Baitar (Twelfth Century) pioneered the incorporation of the scientific method into pharmacology and worked on detailed plant classifications. Ibn al-Baitar's works on medicine included two encyclopaedic studies, *Compendium on Simple Medicaments* and *Foods* and *Encyclopedia of Islamic Medicine,* which combined his own knowledge and that of his teacher with Greek and Roman understanding.[100]

Abu-al Qasim, (Albucasis: 936-1013) invented many surgical innovations that would be recognised today, including the surgical needles, the use of catgut and the practice of the surgeries tracheotomy and lithotomy.[101] One of Albucasis' best known works is *The Clearance of Medical Science For Those Who Can Not Compile It,* which contained decades of study and knowledge, focusing on his surgical work. Abucasis is considered the father of operative surgery, undertaking the first thyroidectomy, writing early descriptions of neurosurgical diagnoses and treatment, and adding considerably to the field of paediatrics.[102]

Ibn Zuhr (Avenzoar: 1094-1162) was a surgeon, using animal testing and autopsies, which are practices that would be recognised as part of the medical establishment today. He was also known for his views in challenging the work of Avicenna (Ibn Sinna).[103] His works included procedures for tracheotomy, cataract removal, kidney stone removal and descriptions of pericarditis (inflammation of tissue surrounding the heart) and mediastinal abscesses (which affect organs and tissues of the thorax). [104]

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[100]Wallis (ed.) Medieval Medicine: A Reader. P227. See also: UNESCO. N.d. *The Spread of Disease along the Silk Roads: The Development of Medical Botany and Pharmacology.* Available from: https://en.unesco.org/silkroad/content/spread-disease-along-silk-roads-development-medical-botany-and-pharmacology [Accessed: 21/9/21]

[101]Edriss, Rosales, Nugent, Conrad, Nugent, 'Islamic medicine in the Middle Ages.' Pp226-227.

[102]S. S. Amir, A. Tbakhi. 2007. 'Abu Al Qasim Al Zahwari (Albucasis): Pioneer of Modern Surgery.' *Annals of Saudi Medicine*. Vol. 27, No. 3. (May-June). Pp220-221: And: The Editors of the Encyclopaedia Britannica. 2020. *Abū al-Qāsim al-Zahrāwī: Muslim physician and author*. Available from: https://www.britannica.com/biography/Abu-al-Qasim [Accessed: 27/9/21]
Edriss, Rosales, Nugent, Conrad, Nugent, 'Islamic medicine in the Middle Ages.'. Pp226-227.

[104]The Editors of Encyclopaedia Britannica. 2021. *Ibn Zuhr, Spanish Muslim physician*. Available from: https://www.britannica.com/biography/Ibn-Zuhr [Accessed: 21/9/21]

Ibn Rushd (Averroes (1126-1198) was a student of Ibn Zuhr, who amalgamated Islamic and ancient Greek thought, writing summaries of both Aristotle and Plato. Averroes' ability to work through and explain ancient philosophers' ideas made them more accessible to western physicians and philosophers, as well as Islamic scholars, than they had been before. [105]

Al-Nafis (1212-1288) laid the down the basics of the pulmonary circulatory system in his commentary on Avicenna in *Commentary on the anatomy of Canon of Avicenna*.[106] There, he argued that blood from one chamber of the heart cannot flow though the wall between ventricles, that the lungs are composed of multiple parts and that the blood from the right chamber of the heart goes to the pulmonary artery and the left, to the pulmonary vein. Going even further, he refuted Avicenna's idea that it is the blood within the right side of the heart that feeds it, whereas al-Nafis asserted it is the blood vessels running through it.[107]

Over time the amalgamation of the works of the scholars above, and Western thought became an intrinsic part of Western medicinal study. Arabic and Persian authors were not only highly influential within disseminating their own work but those of the earlier ancient authors such as Hippocrates, Aristotle and the medieval favourite Galen. For this reason, some Eastern authors have been included in above sections [108]

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[105]E. I. J, Rosenthal. 2021. *Averroës, Muslim philosopher*. Available from: https://www.britannica.com/biography/Averroes [Accessed: 21/9/21]: See also: Siraisi*, Medieval & Early Renaissance Medicine: An Introduction to Knowledge and Practice*, Pp12, 81-85, 108, 119, 146.

[106]Edriss, Rosales, Nugent, Conrad, Nugent, 'Islamic medicine in the Middle Ages.'. Pp226-227: See also: M. Akmal, M. Zulkifle, A. H. Ansari. 2010. Ibn Nafis – A Forgotten Genius In The Discovery Of Pulmonary Blood Circulation. *Heart Views*. Vol. 11. No. 1. Pp26-30.

[107]Edriss, Rosales, Nugent, Conrad, Nugent, 'Islamic medicine in the Middle Ages.'Pp226-227: See also: Akmal, Zulkifle, Ansari, 'Ibn Nafis – A Forgotten Genius In The Discovery Of Pulmonary Blood Circulation.'Pp26-30.

[108]Porter, *The Greatest Benefit to Mankind: A Medical History of Humanity from Antiquity to the Present*, Pp 93-109: See also: Siraisi, *Medieval & Early Renaissance Medicine: An Introduction to Knowledge and Practice*, Pp12-59, 140,142-3.

Medical Concepts

This section aims to discuss some of the concepts central to medieval medicine and its practitioners from the hierarchy of the body to humours and the influence of the outside world upon the body. In the medieval period, the body was viewed as having a hierarchy of importance. This started with the head as the most important body part and moved downwards. In Galenic medicine, the heart was seen as the pre-eminent organ, followed by the brain and liver, with genitals sporadically included. The organs were then grouped into three systems, which were given different properties: vital virtue (heart - spiritual), animal (psychic - soul), spirit (heart and arteries – brain function and sight). Mendino de Luizzi's *Anatomy* gave three body parts as principal containers within the body, the superior ventricle (Animal members: Brain, skull), middle ventricle (Spiritual members: heart and lungs), inferior ventricle (Natural members: Liver, viscera, and abdominal organs).[109] Galenic tradition also believed veins and arteries operated as separate systems. Where perspective came into the hierarchy (vision and optics) and the psychological and cognitive side of visions were discussed by various scholars including Plato, Galen, Aristotle, Avicenna, Averroes, Al-hazan. [110]

The *Lelamour Herbal*, however, follows an alphabetical format rather than that of body hierarchy see in manuscripts such as Oxford, Bodleian Library, MS Rawlinson c. 299.[111] Minta Collins gives an example of an Alphabetical Herbal and its recensions in *Medieval Herbals: The Illustrative Traditions* and it is this format tradition that Lelamour appears to have followed, perhaps for ease of finding the necessary usages for each plant, and their effects. [112]

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[109]Siraisi, *Medieval & Early Renaissance Medicine: An Introduction to Knowledge and Practice*, Pp78, 86, 90-96, 108-9.
[110]*Ibid.* Pp80-1, 107-9.
[111]Moreno Ollala (ed*.) Lelamour Herbal*. Pp26: and: M. Connolly. 2016. 'Evidence for the Continued Use of Medieval Medical Prescriptions in the Sixteenth Century: A Fifteenth Century Remedy Book and its Late Owner.' *Medical History*. Vol. 16. No. 2. April. Pp133-154.
[112]Collins. *Medieval Herbals: The Illustrative Traditions*. Pp33-301.

Galenic humoural-based medicine is the basis for much of medieval medicine and references to these humours can be seen inconsistently throughout the Lelamour text. Galen's ideas of the body followed on from Hippocrates and Aristotle, the body was constructed of the four elements: earth, air, fire and water. These elements made four humours: blood, phlegm, and black and yellow bile. These humours needed to be kept in balance in order to keep or make and individual healthy. Balance could vary from person to person, with some having more of one humour than another thus affecting their personality (or complexion) through its properties. Someone that was sanguineous (blood) was happy, someone who was choleric (yellow bile) tended to be argumentative, black bile would make an individual melancholic and phlegm produced disinterest and cowardice. The properties of these humours and their effects on the body thus influence how a physician needed to treat their patients. [113] Yellow bile was associated with fire, giving it the properties of hot and dry; blood, associated with air, was hot and wet; phlegm was associated with water and thus cold and wet; and black bile was correlated with Earth, and therefore cold and dry. These properties were mirrored in the natural world. Food and plants were deemed to have hot, dry, wet or cold properties. These properties could then be used to adjust a patient's humours by using the opposing properties.[114] Mount provides us with an example:

> Too phlegmatic – cold and moist – he would prescribe something hot and dry like spicy beef. Too choleric – hot and dry – a fish diet would be advised.[115]

Seasons and climate could also affect humoral balance. As in today's society, respiratory infections are far more common in the colder winter weather than in the summer. In medieval medical theory this translated with an illness like a cold, as an excess of phlegm with symptoms such

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[113]Collins. *Medieval Herbals: The Illustrative Traditions.* Pp53-54: See also Porter, *The Greatest Benefit to Mankind: A Medical History of Humanity from Antiquity to the Present*, Pp 56-7: and: Hartnell. *Medieval Bodies: Life, Death and Art in the Middle Age*s. Pp12-15.

[114]Porter, The Greatest Benefit to Mankind: A Medical History of Humanity from Antiquity to the Present, Pp 56-7: See also: Hartnell. *Medieval Bodies: Life, Death and Art in the Middle Ages*. Pp12- 15.

[115]Mount*, Medieval Medicine; It's Mysteries and Science*.Pp54: See also: Hartnell. *Medieval Bodies: Life, Death and Art in the Middle Ages*. Pp12-15.

as a runny nose and cough. Cold winter wind and rain impacting on the patient's humours caused an imbalance resulting in a cold. Climate also held impact; Northern peoples were considered phlegmatic whereas Southern peoples were seen as hot and dry. Diet, as already mentioned, was an important part in counteracting or preventing an imbalance, altering diet or lifestyle (for example, reducing the amount of alcohol consumed or sleeping more) were attempted first, then medication or other methods were used if the patient had not suitably recovered. The same principles were applied to medicinal ingredients, they needed to be hot, dry, wet, cold, or combination of these things in an effort to counteract imbalanced humours. [116]

With a few hundred years of scientific development behind us the idea of humours and some of the ingredients and theories we find in medieval texts seem almost alien to us. Most of us would likely baulk at the idea of gutting a cat to cure period pain, although the logic of the warmth of the carcass laid on the stomach is somewhat similar in effect to using a hot water bottle. [117] Both Hippocrates and Galen were hesitant about the need for surgery for cancer, as surgery s seen as a lesser intervention.[118] Some medieval medicine may be ineffective but that does not mean all of it is. However alien some remedies seem, others may be worth taking another look at. Although a cat may not have needed gutting in order to produce heat, the idea of using heat for aid with cramps is sound.[119] Modern medicine, as Mount notes, has found healing properties in surprising places. The venom found in in Gila monsters has been synthesised and can be used to treat type 2 diabetes.

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[116]Mount*, Medieval Medicine; It's Mysteries and Science*. Pp53-55: See also: Porter, *The Greatest Benefit to Mankind: A Medical History of Humanity from Antiquity to the Present*, Pp 56-7.
[117]W. R. Dawson. 1934*. A Leechbook or Collection of Medical Recipes of the Fifteenth Century*. Macmillan, London.P89. In: Mount*, Medieval Medicine; It's Mysteries and Science*. P116.
[118]Pearn, 'Master John of Arderne (1307-1380): a founder of modern surgery.' Pp46-51: and: Porter, *The Greatest Benefit to Mankind: A Medical History of Humanity from Antiquity to the Present*, Pp 59
[119]Mount, *Medieval Medicine; It's Mysteries and Science*. P116: See also: A. Jha. 2006. *Heat 'relieves internal pain'.* Available from: https://www.theguardian.com/science/2006/jul/05/health.society [Accessed: 21/9/21]: and: J. Jo, S. H. Lee. 2018. 'Heat therapy for primary dysmenorrhea: A systematic review and meta-analysis of its effects on pain relief and quality of life.' *Scientific Reports*. Vol. 8. No. 16252. Pp1-8.

With this in mind, perhaps some medieval remedies were not quite as bizarre as they seem at first glance.[120]

Medieval treatment, in terms of method, is more comparable to holistic types of medicine than to that which you might experience in the doctor's office. In medieval medicine, by treating the symptoms of humoural imbalance, and managing them, you could treat the illness causing them. By looking at the imbalance of humours a patient was suffering from, suggested by the symptoms, balance could be restored, and the patient healed. It was also seen differently as discipline, particularly in the early medieval period. Today we think of medicine solely as a science, whereas in the medieval period it was seen as art and natural philosophy, before it moved towards scientific associations in the later-medieval and early Renaissance periods.[121]

The Lelamour Herbal

The *Lelamour Herbal* is a late medieval herbal of roughly 215 entries.[122] The frontispiece is misleading, suggesting that the manuscript is autographic, in that it is the work of Lelamour himself. London, British Library, Sloane MS 5, ff.13ra-57ra. is the only extant copy of this work. However, Olalla believes it is a copy (ca. 1460) of Lelamour's autograph dated to 1373-7 or another exemplar.[123] It features various dialects from northern England, the south-west Midlands and Essex. It appears to be closest in content to the Northern Macer translations of the *De viribus herbarum*.[124] The frontispiece is also misleading in suggesting that Lelamour was the translator; Olalla discusses the distinctive Northern dialect within the herbal which indicates that Lelamour was the compiler of the herbal, not the author or translator, as he copied information (and dialects) from other

[120]Mount, *Medieval Medicine; It's Mysteries and Science*. Pp118-9.
[121]Hartnell. *Medieval Bodies: Life, Death and Art in the Middle Ages*. Pp12-16.
[122]Moreno Ollala (ed.), *Lelamour Herbal*. Pp126, 130, 171, 180.
[123]London, British Library, Sloane MS 5, ff.13ra-57ra: In: Moreno Ollala (ed.), *Lelamour Herbal*. Pp14-16.
[124]D. Moreno Olalla. 2013. 'The Textual Transmission of the *Northern Macer* Tradition.' *English Studies.* Vol. 94. No. 8. Pp931-957.

manuscripts. MS Sloane 5 is the only copy of the herbal to carry Lelamour's name. Olalla's analysis of the text suggests that in 1373 a south-west Midlands author copied a Middle English translation of *De Viribus Herbarum* that had been created in Northern England[125] identified like Lelamour by the dialect. This author could be Lelamour; the editing of the text suggests this author was someone well versed on natural science, which would fit the hypothesis of Lelamour being a Hereford Cathedral Schoolmaster, which would have allowed him access to a well-stocked library. The autograph which is the only copy we can safely pin to Lelamour himself, or another exemplar, was then copied in London in around 1460.[126] Another manuscript previously believed to be another copy of the *Lelamour Herbal* held in the Glasgow university library is in fact a copy of *De viribus herbarum*, wrongly attributed to Lelamour. Olalla suggests it is also incorrectly dated and therefore another a copy of this early exemplar, like MS Sloane 5.[127]

As already noted, the *Lelamour Herbal* has multiple related manuscripts that all appear to share a common ancestor. The extant Sloane 5 manuscript appears to be a copy of Lelamour's *original* version and is the only known manuscript to carry his name. Olalla's theory is that someone, probably Lelamour, compiled the original around 1373, using a version of Macer Floridus' *De viribus herbarum* made in Northern England. Either the first copy of this or a secondary copy of it became the Sloane 5 exemplar for its composition around 1460. Glasgow, Glasgow University Library, Hunter Collection MS 497, ff. 1r-92r. in the Hunterian collection of Glasgow University library is a connected MS, mislabelled in the collection as another manuscript by Lelamour was possibly also copied from this exemplar. Olalla points out however that the hands in GUL MS 497 do not match this date, making it later fifteenth century.[128] Interestingly, although Calle-Martín and Miranda-García

[125]The only surviving copy of Northern dialect being Oxford, Bodleian Library, Additional MS A.106, ff. 244r-259r: In: Moreno Olalla (ed.)*, Lelamour Herbal.* P19.
[126]Moreno Ollala (ed.), *Lelamour Herbal.* Pp11-115.
[127]London, British Library, Sloane MS 5, ff.13r-57r*:* In: *Ibid.* Pp14-16. Dialects also include South-eastern, London, South-west (Bristol/Hereford, ie. Lelamour), Celtic, Brittonic as well as possible Norse morphology. Pp47-50.
[128]Glasgow, Glasgow University Library, Hunter Collection MS 497, ff. 1r-92r: In: Moreno Ollala. (ed.) *Lelamour Herbal*. Pp13-28.

acknowledge the connection between London, British Library, Sloane 5, MS 5, ff.13r-57r and Glasgow, Glasgow University Library, Hunter Collection MS 497, ff. 1r-92r in terms of source material, there is no mention of the Glasgow manuscript's previously misattributed authorship to Lelamour.[129]

Another related manuscript is the aforementioned Northern Macer, which is an English version of the *De viribus herbarum* made in Southern England. One version of the is extant: Oxford, Bodleian Library, Additional MS A.106, ff.244r-259r.[130] Lelamour did not use this particular text as a source for the *Lelamour Herbal* but a different version of it known as the Rue Herbal. Two copies of this survive: London, Wellcome Library, MS 5650, ff.292-39v and Cambridge, Magdalene College, Pepys MS 1661, pp266-284. The *Lelamour Herbal* would have been one of a number of herbals using the Rue Herbal as a source. The fragmentary Thornton Herbal, (Lincoln Cathedral, Dean and Chapter Library MS 91, ff.315r-321v) appears to derive from either the Northern macer or the Rue herbal, alongside London, British Library, Sloane MS 7, f. 105v.[131] The above version has previously assumed to be copied from Lelamour's original, but Olalla states that palaeographic, textual and linguistic evidence works against this. Brodin looks at London, British Library, Sloane MS 2948, Olalla states, as a possible match to the *Lelamour Herbal*, however because Lelamour did not directly copy the

[129]J. Calle-Martín, A. Miranda-García. (eds.)2012. The Middle English Version of *De viribus herbarum* (GUL MS Hunter 497, ff. 1r-92r): Edition and Philological Study. *Late Middle English Texts*. Peter Lang, Bern. Pp 1-45: See also Glasgow, Glasgow University Library, Hunter Collection MS 497, ff. 1r-92r: In: Moreno Ollala. D. (ed.) *Lelamour Herbal*. Pp15: and: London, British Library, Sloane 5, MS 5, ff.13r-57r: In: Moreno Ollala. (ed.) Lelamour Herbal. Pp12, 47-51: and: Oxford, Bodleian Library, Additional MS A.106, ff.244r-259r: In: Moreno Ollala. (ed.) Lelamour Herbal. Pp19: and: London, Wellcome Library, MS 5650, ff.292-39v: In: Moreno Ollala. (ed.). *Lelamour Herbal.* Pp20: and Cambridge, Magdalene College, Pepys MS 1661, Pp266-284: In: Moreno Ollala. (ed.) *Lelamour Herbal.* P20: and: Lincoln Cathedral, Dean and Chapter Library MS 91, ff.315r-321v: In: Moreno Ollala. (ed.) *Lelamour Herbal*. Pp20

[130]Moreno Ollala (ed.), *Lelamour Herbal*. Pp16-28: and: Oxford, Bodleian Library, Additional MS A.106, ff.244r-259r: In: Moreno Ollala. (ed.) Lelamour Herbal. Pp19.

[131]Keiser, 'Reconstructing Robert Thornton's Herbal.' Pp35-53: and: Lincoln Cathedral, Dean and Chapter Library MS 91, ff.315r-321v: In: Moreno Ollala (ed.), *Lelamour Herbal*. Pp16-28: and: London, Wellcome Library, MS 5650, ff.292-39v: In: Moreno Ollala. (ed.). *Lelamour Herbal.* Pp20: Magdalene College, Pepys MS 1661, Pp266-284: In: Moreno Ollala. (ed.) *Lelamour Herbal.* P20: And: London, British Library, Sloane MS 7, f. 105v: In: Moreno Ollala. (ed.) *Lelamour Herbal.* Pp20.

wordings, this is tentative. [132] The final identified source is a translation of *The Virtues of Rosemary,* but Moreno Olalla does not indicate a specific manuscript in connection to this herbal. The rest of the sources in the herbal are untraced, but Moreno Olalla has grouped them to indicate that many may have come from the same unidentified sources. The number of connected manuscripts shows how popular some of the connected texts were and how widely herbal information was transmitted.[133]

The dialects found in the *Lelamour Herbal* and the explicit's reference to Hereford, have led to the belief that Lelamour was probably the Hereford Cathedral School Master. The knowledge contained within the *Lelamour Herbal* suggests that he had access to a variety of sources and had received a good education. There are multiple hands used within the manuscript. Hand A is the main scribe, which Moreno Olalla breaks down into 3 stages, used for different functions: Hand A^1 wrote the main text using Bastard Anglicana script dated to 1460, and this is supported by water marks. [134] Hand A^2 filled in keywords and authors where A^1 left them blank.[135] Hand A^3 is identifiable through use of pigment (red and blue) to highlight areas of text, such as the beginnings of major parts of the text, headwords and subsections, names, and the main hand's marginal annotations.[136] The remaining hands are those that have added annotations to the text or margins of the herbal. One of the hands found within the manuscript is the first known owner, Richard Dod, a surgeon. He is the only known individual (securely) connected to the *Lelamour Herbal* manuscript until it fell into the hands of Hans Sloane. Dod is identified as Hand B by Moreno Olalla due to his inscription and Anglicana script (1460-70s) annotations, and it is known that he had access to the manuscript

[132]Moreno Ollala (ed.), *Lelamour Herbal.* Pp16-28.
[132]Brodin. *Agnus castus: A Middle English herbal reconstructed from various manuscripts: Edited with introduction, notes and glossary by Gosta Brodin.* Pp20-25.
[133]Moreno Ollala (ed.), *Lelamour Herbal*.Pp14-28: and: Moreno Ollala, 'The Textual Transmission of the *Northern Macer* Tradition.' Pp931-957.
[134]*Ibid*.Pp68-71.
[135]*Ibid.*Pp71-72.
[136]*Ibid*. Pp73-74.

around the 1470s and may well have commissioned the copy.[137] Hand C appears to be older, which suggests that the manuscript is slightly older. Hand C (Robert Sandys, postulated to have been Dod's apprentice[138]), the second most prolific appears to have been written, Olalla states, before much of the main text due to handwriting style, suggesting a date of around 1450. However, the hands annotations are positioned after other hands making it likely they were added as later comments on the text.[139] Hand D's date is unidentified, and Hand E appears to be fifteenth-sixteenth-century hand writing annotations on the text. Hand F is thought to be Tudor (ca. 1525-30); Olalla compares the hand to that of Thomas More. All the above reinforces the idea that this manuscript is a copy, not an original of the 1370s herbal.[140]

The organisation of the *Lelamour Herbal* is untidy with various entries being duplicated under different names; Black Hellebore appears under Longwort, Pedelyon, and Walworte. Entries were arranged based on the Middle English name's initial letter, suggesting that the manuscript was potentially written in batches by copying from one source and then another until the necessary information was filled in. Entries from *De viribus herbarum* and the *Agnus castus* however, have been scattered through the blocks of letters but *Agnus castus* is continuous in some (B, E, I & /W). Olalla suggests this disorganisation could be down to names from the Northern Macer transferring easily but those in Latin texts like *Agnus castus* were harder, and the vernacular name may not have been identifiable, or Lelamour's copy of the *Agnus castus* was also disorganised. Unidentified sources appear at the end of letter blocks.[141]

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[137]*Ibid.* P77

[138]Moreno Ollala (ed.), *Lelamour Herbal.* Pp66,

[139]*Ibid.* P78.

[140]*Ibid.* Pp78-80. See also: A. G. Petti. 1977. *English Literary Hands from Chaucer to Dryden. Harvard University Press, Cambridge*. Letter to Cardinal Wolsey dated 30/10/1523. 17. In Olalla (ed.), *Lelamour Herbal* P80.

[141]Olalla (ed.), *Lelamour Herbal*.Pp16,26-28.

Transmission

Transmission of texts through copying is part of medieval historiography. Classical authors' work was disseminated by copying and tweaking information for the relevant audiences. The *Lelamour Herbal* has various established sources, as well as additions from unknown sources, or perhaps from Lelamour and his scribe(s). In Calle-Martín and Miranda-García's commentary of Glasgow, Glasgow University Library, Hunter Collection MS 497, ff. 1r-92r this leads to the *Lelamour Herbal* being labelled a 'false' Macer – it is not a true copy.[142] This repeated transmission has often led towards the view that medicinal knowledge in the Middle Ages was stagnant, though works such the *Lelamour Herbal* suggest a desire to change and innovate rather than purely copy:

> [Osler] closes the chapter in this vein: "in medicine the Middle Ages represents a restatement from century to century of the facts and theories of the Greeks modified here and there by Arabian practice. There was, in Francis Bacon's phrase, much iteration, small addition. The schools bowed in humble, slavish submission to Gallen and Hippocrates, taking everything from them but their spirit…." Even today, Osler's negative caricature of mediaeval medicine persists not only in popular culture, but even in textbooks designed for university classrooms.[143]

Modern medical fields carry heritage of nineteenth century researchers such as Osler, and other such as Charles Darremberg who made concerted efforts to expand and consolidate medical knowledge, using medieval manuscripts. To gain a full grasp of medieval medicine, and its workings then it is not herbals alone that need to be consulted but works of law, history, science, philosophy, administration and so on.[144] Abridging and supplementing texts is something we see throughout medieval medical literature across Greek and Latin sources, Wallis observes that theory is often

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[142]Calle-Martín, Miranda-García, (eds.), 'The Middle English Version of *De viribus herbarum* (GUL MS Hunter 497, ff. 1r-92r): Edition and Philological Study.' P22.
[143]Osler. *The Evolution of Modern Medicine: A Series of Lectures Delivered at Yale University on the Siliman Foundation in April, 1913*. P125. In: Wallis (ed.). *Medieval Medicine: A Reader*. P xviii.
[144] *Ibid.* P xix

removed whilst prognostics and diagnostics tend to be kept causing the 'decanonisation' of medical literature.[145]

It is noticeable that despite the heavy influence of Arabic authors on the Western medical field during the medieval period, that there are no direct mentions of Arabic sources in the *Lelamour Herbal*. Lelamour's sources such as the *De viribus herbarum* have little to no eastern influence in their sources.[146] The cross-pollination from East to West means that is unlikely that there is no Eastern influence at all in Lelamour's writing but that any influence that is there is hard to discern due the Classical authors being references rather than the Arabic authors who served as conduits of transmission. Editors of the medicinal text, with an English audience in mind, have edited out some of the more exotic ingredients to better suit the intended audience. With this is mind, again Eastern influence may be extant in Lelamour's sources but not directly in the text itself.[147] In the following chapter any possible connection to an Eastern or Arabic influence will be mentioned where perceived.

In *Success and Suppression*, D. N. Hasse discusses the influence of Arabic thought on the Renaissance. In order to comprehensively present and explore this, he also addresses some of the medieval history concerning the amalgamation of eastern and western knowledge. The Arabic contribution to western thought is considerable, but is problematic, as it has fallen in and out of favour over time. This changing favour may explain the lack of influence present in the *Lelamour Herbal*: from the late medieval period into the Renaissance there was a shift under humanist philosophy away from Arabic thought and sources, and a return to the ancient Greek. Hasse also notes however, that this humanist move away from the Arabic was not wholesale in scholarly discourse. Hasse discusses the biases in Arabic influence research and exploring arguments for both

[145]Wallis (ed.). *Medieval Medicine: A Reader*. P23.
[146]Moreno Ollala (ed.), *Lelamour Herbal*. Pp11-510: and Calle-Martín, Miranda-García (eds.), 'The Middle English Version of *De viribus herbarum* (GUL MS Hunter 497, ff. 1r-92r): Edition and Philological Study.' Pp13-193.
[147]Wallis (ed.). *Medieval Medicine: A Reader.* P xix: and: Moreno Ollala. (ed.), *Lelamour Herbal*. Pp11-92.

a minimal and maximum impact. Those arguing for a minimal impact were often influenced by an anti-Islamic sentiment. He also notes that despite the humanist's best efforts a total return to Greek thought was not successful, and work surrounding Arabic scholars often formed the nuclei of new developments in pharmacology and botany. As the Renaissance dawned Arabic authors were still a major player in medical discourse, but the translation of sources had gradually petered out at the end of the thirteenth century. Although the *Lelamour Herbal* is pre-Renaissance, the beginnings of the humanist movement in the manuscript can perhaps be discerned; the herbal mentions only Greek authors, and uses sources that have little to no Arabic influence apparent in them, and almost all the plants could be found or sourced in a British context rather than an Arabic one. [148]

Overall, the *Lelamour Herbal* provides the reader with a Middle English text, with information selected from a range of sources. The compilation shows the long history of Hippocratic and Galenic medicine, alongside other popular texts such as the *Agnus castus*, and *De viribus herbarum*. It also evidences how eastern medicinal ideas became incorporated into western medicinal thought and practice; no Arabic or Persian authors are directly mentioned in the *Lelamour Herbal* and yet many texts, particularly those of Galenic origin, first reached Europe via Arabic and Persian authors. In the *Lelamour Herbal* and its associated sources the transmission of herbal traditions can at least in part be seen. It also provides evidence, through Olalla's deductions, that the removal of entries with 'exotic' ingredients from the sources were deliberately omitted to tailor the work to Lelamour's intended audience, their tastes and what was likely to be available to them. In short, the herbal is an undoubtedly a valuable source that has been used by later practitioners like Dod, and likewise may offer a wealth of information for modern practitioners.[149]

[148]Hasse, 'Success and Suppression.'. Pp xi-133: and: Moreno Ollala (ed.), *Lelamour Herbal*. Pp11-94.
[149]Moreno Ollala (ed.), *Lelamour Herbal*. Pp11-92.

Content of the Lelamour Herbal: Chapter 2

The task of this chapter is to introduce the reader both to the idea of inflammation, and to provide a rough outline of the medical processes involved. Following this the chapter will discuss the sampled remedies, their text of origin, the sources they are based on if these are identified, and any annotations will be mentioned where a hand has sought to make an addition to the text. The spreadsheet (see Appendix) contains only those remedies that appear to have potential anti-inflammatory properties. These remedies mention pain, swelling, redness or heat. Those that mention cancer have also been included in this spreadsheet. This is due to the fact that some cancers can be treated, at least in part, with anti-inflammatory drugs and they will therefore be included in the discussions below where relevant. Where it has been possible the Arabic influence on the herbal has been traced. However, in the majority of cases although there is likely Arabic influence on the herbal's sources it has not been possible to trace it directly.[150]

[150]Moreno Ollala (ed.), *Lelamour Herbal*. Pp115-293: and: B. Bryson. 2019. *The Body: A Guide for Occupants*. Doubleday, London. Pp203-4. And Dinarello, 'Anti-inflammatory Agents: Present and Future.' Pp935-950.

Inflammation and Anti-inflammatories

Anti-inflammatories are often used as pain killers. Inflammation causes swelling which can press on nearby nerves, or creates cell damage which causes pain. Inflammation is essentially the fallout of the immune system protecting the body: blood vessels dilate to allow blood and therefore white blood cells, which are part of the immune system, access to the infection or foreign body it needs to fight. This causes the classic symptoms of inflammation: swelling, redness, heat and pain. White blood cells can leave the blood to pass through bodily tissues in order to attack threats, releasing the cytokine that causes most of the inflammatory response.[151]

There are various ways of tackling inflammation using anti-inflammatories. Cytokines are small proteins that cells use in signaling to each other and they signal an inflammatory response as well as enhancing inflammation through the COX (Cyclo-oxygenase) pathways. The cytokines signal the need for immune cells (myeloid cells: monocytes and neutrophils) in the necessary areas, which then envelope and destroy infections or foreign bodies (phagocytosis). One of the main routes used is the blocking of the 'pathways' by which the body produces inflammatory chemicals (such as prostaglandins and cytokines). The pathways known as COX-1 and COX-2 cause different levels of inflammatory response; COX-1 tends to cause a lesser inflammatory response designed to help regulate conditions in the body. COX-2 is associated with a larger response relating to infection, disease, and chronic inflammation (and thus pain). COX-2 inhibiting drugs tend to have a harsher effect on the body, with more side effects. Suppressing cytokines appears to prevent inflammation which is involved in the development of cancer; cytokines have been seen in the process causing cancer and it is believed that in suppressing them the development of cancer may be arrested. For cytokines to be suppressed something that acts like an antibody, or receptor that will block them from producing inflammatory substances is needed. For example, chemokines, a type of cytokine

[151]Bryson, *The Body: A Guide for Occupants*. Pp203-4. See also: Dinarello, 'Anti-inflammatory Agents: Present and Future.' Pp935-950.

have been used in the treatment of the inflammatory disorder Crohn's disease, as they act as receptor 'antagonists' which inhibit activation of a given nerve receptor. [152]

Some other chronic inflammatory diseases are also autoimmune – they are caused by the immune system's dysfunction. In this case it is immune system B cells, T cells or dysfunctional macrophages (types of white blood cell) instead of cytokines that are the issue. As with the above, by disrupting the processes these cells perform, the inflammatory response is reduced. This reduces the damage to the body, despite multiple routes of attack. By limiting at least one type of cytokine's actions, the inflammatory response can be brought under control. Blocking a cytokine stops the reaction in its tracks. Dinarello provides several other mechanisms with which to prevent inflammation: prostaglandins, anticytokine biologicals such as natalizumab, natural inhibitors such as IL-1Ra, protease inhibitors, kinases, statins, histone deacetylase inhibitors, and complement inhibitors can all be used to reduce inflammatory actors such as interleukins, TNF-a, COX, NOS, and inflammatory immune cells. As previously mentioned, the majority of treatments are problematic because they reduce inflammation by reducing the host's immune response, but despite this have relatively few other side effects. [153]

Some treatments to prevent inflammation use resolvins, which are found naturally in the body, and they bind to cells to prevent inflammation. Synthetic forms are being tested as they appear to prevent myeloid cells from entering the tissue in which they would otherwise create inflammation.[154] Other treatments for diseases such as gout use glucocorticoids. These reduce

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[152]AG Scientific. 2019. *Chemical Receptor Agonists and Antagonists*. Available from: https://agscientific.com/blog/2019/03/chemical-receptor-agonists-and-antagonists/ [Accessed: 21/9/21]: and: Dinarello, 'Anti-inflammatory Agents: Present and Future.' Pp935-950. And: T. Kuwano, S. Nakao. H. Yamamoto, M. Tsuneyoshi, T. Yamamoto. M. Kuwano, M. Ono. 2004. 'Cyclooxygenase 2 is a key enzyme for inflammatory cytokine-induced angiogenesis.' *FASEB*. Vol. 18. No. 2. Pp300-310.

[153]Dinarello, 'Anti-inflammatory Agents: Present and Future.'. Pp935-950. And Kuwano, Nakao, Yamamoto, Tsuneyoshi, Yamamoto, Kuwano, Ono, 'Cyclooxygenase 2 is a key enzyme for inflammatory cytokine-induced angiogenesis.'Pp300-310.

[154]Dinarello. 'Anti-inflammatory Agents: Present and Future.' Pp936.

inflammation by binding to cytokines and altering their DNA to stop them triggering the anti-inflammatory process. [155]

Inflammation at a low level, or in response to an infection is not necessarily a problem in and of itself. It is part of the body's immune response to threats. The issue with the inflammatory response is that it is it is an 'innate' response, rather than one that is learnt from a specific infection or an adaptive allergy, that the body has developed but would not usually cause a response, for example.[156] This lower level of focus can cause issues however, as although cytokines respond and help repair after an infection has been dealt with, prolonged inflammation by cytokines can cause damage to surrounding cells. This is thought to be the cause of many inflammatory diseases, as it can result in damage of lung tissue, reducing ability to transfer gasses, and also damages the sheaths that protect nerves from the brain, spinal fluid and other tissues. The issue with using drugs that are anti-cytokine is that although they prevent disease, they also dampen immune response. It must be noted however, that inflammation of this kind at a low level is not necessarily a problem. [157]

Anti-cancer properties

Anti-cancer properties sometimes appear in combination with anti-inflammatory properties. Cancer develops through cells and their connected immune responses going amiss. One of the main ways this occurs is that cells become dysfunctional and thus trigger the inflammatory process. Under normal conditions this would shut down the cell once the object of infection causing the inflammation is removed. In the case of cancer, this does not happen because it is the body's own cells that are causing the problem. Inflammation from cancer cells causes surrounding tissue damage as well as the growth of tumours by triggering inflammation in surrounding cells. Therefore, the use

[155]*Ibid.* Pp935-950.
[156]Health Engine. 2021. *Acquired immune system (B Cells and T Cells*). Available from: https://healthinfo.healthengine.com.au/acquired-immune-system-b-cells-and-t-cells [Accessed: 21/9/21]
[157]Dinarello, 'Anti-inflammatory Agents: Present and Future.' Pp935-950.

of anti-inflammatories in treating cancer (in some cases) can help to stop the disease by preventing tumours from growing and blocking the cancer from undergoing metastasis (spreading). Many cancer treatments also have distinctly unpleasant side effects. For example, they dampen the immune system, leaving the patient vulnerable and can also attack the body as well as the cancerous cells. Therefore, the possibility of new sources of cancer treatment, such as anti-inflammatories are important to note if they can contribute towards reducing the disease and the potential side effects of treatment. Thus, although anti-cancer treatments are not the focus of this research, they will be discussed as they appear. [158]

Antioxidants

Antioxidants scavenge particles known as free radicals. These are atoms that are missing an electron, making them highly reactive within the body. They are oxygen atoms, known as reactive oxygen species (ROS). Once they lose their electron, they are then classed as oxidants. This means that any excess of these free radicals needs to be removed from the body before these atoms can do damage by reacting with chemicals or cells. If free radical numbers rise within the body, this creates oxidative stress (accumulation of oxygen/ROS is toxic to cells), which can cause DNA damage, cell damage, inflammation and in the longer term, disease.[159]

[158]Appendix: Dragancia/Adderwort: 5A-L; Dragancia femina: 24A-L; Persicaria Culrage 22A-L; Erbe Robert:26A-L.

[159]V. Lobo, A. Patil, A. Phatak, N. Chandra. 2010. 'Free radicals, antioxidants and functional foods: Impact on human health.' *Pharmacognosy Review*. Vol. 4. No. 8 July-December. Pp118-126.

Plant Identification

Some herbs in the *Lelamour Herbal* a relatively straightforward to identify, for example Rosemary (*Rosmarinus officinalis*). For ease the plants identified by Moreno Olalla will be taken as correct.[160] Others are harder, where information has been confused or the medieval name used no longer tallies with modern ones. Vernacular names could apply to more than one plant and vary geographically. Information in the entries and reference to the Latin sources enables easier identification, as Moreno Olalla suggests. Other tactics include looking at the effect of the herb or comparing Latin and Greek names, but this is problematic as plants in Latin sources may not grow in Britain and therefore different plants to those British authors are aware of. Plants that we now consider singular may not have been seen as such in the Middle Ages. For some plants Moreno Olalla has been able to identify it specifically, some are narrowed down to the genus but not the specific species.[161] Such an example of problematic identification is Mowsere possibly *Auricula muris*, potentially a type of Hawkweed. However, Moreno Ollala generally identifies as *Pilosella officianarum Vaill,* but the Latin name is thought to be *Theligonium cynocambre L.* or subspecies of *Anagallis arvensis L.* Adding to this the Greek plant is thought to be *I Asperugo procumbens* L. or *Myosotis scorpioides L.* Plants that can be identified can also mean dropping a particular plant in favour of another; pympernell (1859) is *Anagallis arvensis L.* not *Pimipinella saxifrage L.* Temperament can also be used as an identifier; Pelletir (1820) can be identified as Pellitory of Spain, not Pellitory-of-the-wall due to difference in temperament.[162]

[160]Moreno Ollala (ed.), *Lelamour Herbal*. Pp86-91.
[161]Moreno Ollala (ed.), *Lelamour Herbal*. Pp16, 84-86.
[162]Moreno Ollala (ed.), *Lelamour Herbal*.Pp 84-92.

The Anti-inflammatory Remedies of the *Lelamour Herbal*

The *Lelamour Herbal* contains 215 remedies, of these nearly half include references to issues such as pain, swelling, cancer and gout, all of which are potentially treatable with anti-inflammatory drugs, as we have just seen. Due to the large sample size only a total of twenty entries and plants are discussed below, all of which look likely to be anti-inflammatory: for example, they treat pain, or swelling. All the remedies that are believed to have possible anti-inflammatory, and anticancer have been included in spreadsheet 2 (See Appendix). Where there are two entries discussing the same plant, the entries have been combined for discussion. Those remedies that treated cancer are included in the spreadsheet (see Appendix) but were initially excluded from the discussion below. However, those plants that were initially identified as anti-cancer, as well as those discovered through later research are included below where space allows. This is due to the fact that inflammation is part of the process of cancer development. Thus, some anti-cancer remedies are also anti-inflammatory and therefore are more relevant to this research than previously realised. The aim of this chapter is to discuss the remedies identified as anti-inflammatory and the mechanisms, where possible, behind their anti-inflammatory activity. In doing so, it is hoped that this will illustrate that the remedies of the *Lelamour Herbal* are not as strange as they may sound to the modern reader. Medicinal remedies such as those found in the *Lelamour Herbal* provide potential new drugs sources which could have benefits to modern medicine - as we have seen in the testing of the eye salve from Bald's Leechbook. The remainder of this chapter will set out the sample of potential anti-inflammatories within the herbal, which could be further tested in terms of efficacy. This section will also include discussion of the issues of identification of plants, and quantity of research available regarding those plants, in order to provide the reader with a better view of the available information. [163]

[163]Moreno Ollala (ed.), *Lelamour Herbal*. Pp11-510: See also: Harrison, Roberts, Gabrilska, Rumbaugh, Lee, Diggle, 'A 1000-year-old Antimicrobial Remedy with Antistaphylococcal Activity.' Pp1-7: See also: Furner-

Remedy 1: Ache/Apium

This is the first remedy of the *Lelamour Herbal*. The plant being discussed here is identified by Olalla as wild celery (*Apium graveolens* L.). The remedy indicates the use of this plant in relation to swellings of the eye and breasts, stomach-burn, reducing venom, cough, a casting womb, improvement of colour (complexion), sudden attack of illness, fever, dropsy, whilst also beneficial for the spleen, and to heal wounds, particularly those only healed superficially ('sursanouris'). As with many of the *Lelamour Herbal*'s remedies they can be used to heal a variety of issues. [164]

There are multiple preparations provided; a plaster made of the juice of the plant and a plaster of wheat breadcrumbs, the root soaked and the juice drunk, eaten raw whilst fasting, drunk in combination with fennel, and again made into a plaster with mill dust (finely ground dust produced by milling flour) and eggs.[165] Wheat (*Triticum aestivum*: breadcrumbs are specified in the remedy[166]) is antioxidant, anti-inflammatory, anticancer, anti-allergy, and radical scavenging. Wheat can induce apoptosis in cancerous cells, as well as being cytotoxic to hepatic and pancreatic cancer cells. The antioxidant property of wheat means that it scavenges free radicals such as NO, and helps to reduce cancer, bacteria, inflammatory reactions, and homeostasis. The ethyl acetate fraction of the plant was found to be a potent inhibitor of NO. Thus, also although it is not a focus of this remedy, wheat would also appear to be a good target for research; Han *et al.*. suggests the plant is likely to beneficial for treating inflammatory diseases.[167] Shah *et al*. have also shown in research for anti-inflammatory drug alternatives, that *T. aestivum* L. is beneficial in treating inflammation induced in rats. The study shows that use of extracts from the plant can be effective against acute

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Pardoe, Anonye, Cain, Moat, Ortori, Lee, Barrett, Corre, Harrison, 'Anti-biofilm efficacy of a medieval treatment for bacterial infection requires the combination of multiple ingredients' Pp1-14

[164]Moreno Ollala (ed.) *Lelamour Herbal*. Pp115, 221-3. Appendix: 2A-L.

[165]Moreno Ollala (ed.) *Lelamour Herbal* P115, 223.

[166]*Ibid.* Pp115, 223, 495.

[167]A. Han, Y. Kil, M. J. Hong, J. Park, H. H. Park, C. H. Jin, J. Nam, J. Kim. 2020. 'Anti-Inflammatory Flavonolignans from *Triticum aestivum* Linn. Hull.' *Applied Sciences*. Vol. 10. Pp1-10. See also: K. Shah, D. Sheth, P. Tirgar, T. Desai, M. Kher, D. Rangani. 2010. 'Anti-inflammatory Activity of *Triticum* Aestivum on Carrageenan Induced Paw Edema in Wistar Rats.' *Pharmacologyonline.* Vol. 2. Pp745-751.

inflammatory disorder, and is comparable to Diclofenac (a commonly used NSAID).[168] For these reasons, if the remedies are researched further particularly in a laboratory context, the impact of these additional ingredients would need to be considered for possible impact on efficacy (as has been done with the eye salve of Bald's Leechbook).[169] Additionally, Fennel is another ingredient, found in this remedy, and is also a known anti-inflammatory, antioxidant, and immunomodulatory. Fennel seeds also have preventative and therapeutic effects against necrotizing enterocolitis (inflammation of digestive tract). Inflammation, oxidative stress, apoptosis and infection are important in the development of the disease; thus, fennel's properties are beneficial. Its ability to control and reduce cytokines such as IL-6 and TNF-a involved in inflammation also help to prevent and reduce necrotizing enterocolitis. The plant can also reduce apoptosis in cells that would usually be seen during the course of the disease, further aiding recovery. This property is also beneficial in terms of treating and controlling cancer. The above properties are also beneficial in preventing the disease in preterm infants.[170] A further study has shown fennel to be anti-fungal, anti-inflammatory, anti-bacterial, antioxidant, antithrombotic and hepatoprotective. The plant contains flavonoids such as rutin, quercetin, kaempferol, and isorhamnetin derivatives, which show antioxidant effects through radical scavenging, superoxide anion scavenging, hydrogen peroxide scavenging and metal chelating. These properties help to lower oxidative stress and therefore inflammation, cancer, and cardiovascular disease. The fruit of the plant shows inhibitory properties against acute and subacute inflammatory diseases, as well as allergies. Extracts have also been shown to be protective of normal human blood cells but also anti-tumoural in relation to melanoma, which means this plant could be a good target for anti-tumour drugs. However, one of the main components of fennel's essential oil

[168]Shah, Sheth, Tirgar, Desai, Kher, Rangani, 'Anti-inflammatory Activity of *Triticum* Aestivum on Carrageenan Induced Paw Edema in Wistar Rats.' Pp745-751.: See also: R. Poudel, M. Bhatta. 2017. 'Review of Nutraceuticals and Functional Properties of Whole Wheat.' *Journal of Nutrition & Food Sciences*. Vol. 7. No. 1. Pp1-6.

[169]Furner-Pardoe, Anonye, Cain, Moat, Ortori, Lee, Barrett, Corre, Harrison, 'Anti-biofilm efficacy of a medieval treatment for bacterial infection requires the combination of multiple ingredients' Pp1-14.

[170]H. I. Yakut, E. Koyuncu, U. Cakir, C. Tayman, I. Koyuncu, T. T. Turkmenoglu, E. Cakir. A. Ozyazici, S. Aydogan, A. Zenciroglu. 2020. 'Preventative and therapeutic effects of fennel (*Foeniculum vulgare)* seed extracts against necrotizing enterocolitis.' *Journal of Food Biochemistry*. Vol. 44. No. 8. P1-11.

estragole is associated with the development of malignancies in rats, which result from unstable molecules and active radicals. Further study on human cells is needed. [171]

Wild celery's entry appears to discuss swelling in multiple contexts; therefore, this plant is an ideal target for an anti-inflammatory remedy, especially with the information provided above. In this case *both* plant ingredients wild celery and fennel have been researched in medical science.[172] As aforementioned, modern research suggests that wild celery is anti-inflammatory. In addition to this, it is also *anti-cancer*, antiulcer, anti-spasmolytic, antimicrobial, antifertility, anti-platelet, cardiotonic and antidiabetic.[173] It is also an antioxidant, a property shared with many of the following remedies, and this works in partnership with anti-inflammatories to reduce inflammation.[174] Celery is also hepatoprotective (prevents liver damage), due to its inflammatory and antioxidant properties protecting against oxidative stress.[175] Celery disrupts several processes that will be mentioned in many of the entries below such as NO: nitric oxide, which causes inflammation when produced at high levels. Additionally, iNOS (inducible nitric oxide synthase), the synthesis of Nitric Oxide, which is caused by inflammation and high levels of this production are observed in chronic inflammatory diseases due to the damage it causes to cells because it increases oxidative stress. Superoxide anion scavenging is another process that appears in multiple entries. Superoxide anions are a form of ROS,

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[171]M. A. Rather, B. A. Dar, S. N. Sofi, B. A. Bhat, M. A. Qurishi. 2016. '*Foeniculum vulgar*: A comprehensive review of its traditional use, phytochemistry, pharmacology, and safety.' *Arabian Journal of Chemistry*. Vol. 9. Pp S1575-S1583.

[172]T. Mencherini, A. Cau, G. Bianco, R. D. Loggia, R. P. Aquino, G. 2007. 'Autore. An extract of Apium graveolens var. dulce leaves: structure of the major constituent, apiin, and its anti-inflammatory properties.' *Journal of Pharmacy and Pharmacology*. Vol. 59. No. 6. Pp891-897: And: Rather, Dar, Sofi, Bhat, Qurishi. '*Foeniculum vulgar*: A comprehensive review of its traditional use, phytochemistry, pharmacology, and safety. Pp S1575-S1583: See also: Yakut,Koyuncu, Cakir, Tayman, Koyuncu, Turkmenoglu, Cakir, Ozyazici, Aydogan, Zenciroglu, 'Preventative and therapeutic effects of fennel (*Foeniculum vulgare)* seed extracts against necrotizing enterocolitis.'. Pp1-11.

[173]Mencherini, Cau, Bianco, Loggia, Aquino, Autore, 'An extract of Apium graveolens var. dulce leaves: structure of the major constituent, apiin, and its anti-inflammatory properties.'Pp891-897.

[174]Lobo, Patil, Phatak, Chandra, 'Free-radicals, antioxidants and functional foods: Impact on human health.' Pp118-126.

[175]E. Madrigal-Santillán, E. Madrigal-Bujaidar, I. Álvarez-González, M. T. Sumaya-Martínez, J. Gutiérrez-Salinas, M. Bautista, Á. Morales-González, M. G. y González-Rubio, J. L. Aguilar-Faisal, J. A Morales-González. 2014. 'Review of natural products with Hepatoprotective effects.' *World Journal of Gastroenterology*. Vol. 20. No. 40. October. Pp14787-14804.

and they are one of the most destructive free radicals due to their high levels of reactivity and therefore, their ability to cause inflammation. Because of this, any antioxidants capable of reducing reactivity are highly valuable in controlling inflammation. [176]

In terms the efficacy of the remedy, the scribal content of the entry also warrants discussion, providing the reader with further background on the herbal, and alterations to the remedy. Hand C (post 1470) appears in annotations of many of the following remedies, and in this entry appears alongside the later hand E. Hand C, Moreno Ollala postulates, could belong to an older individual, as the handwriting is paleographically closer to the scribe hand A, but additions in this hand were added later than hand B (Richard Dod). Hand C gives an additional name for Ache in annotations; 'smaleach' (smallage) and also mentions 'marche', a plant of the same species, perhaps indicating that either plant could be used here. Hand C also includes that wild celery aids urination and acts as a deoppilant (opens obstructions[177]) to the liver, but it is not to be given to pregnant or breastfeeding women, as it draws evil humours into the womb. Hand E (late-fifteenth to early-sixteenth century) also makes an addition here. This hand was the individual who numbered each entry, and Moreno Ollala states that this makes the hand difficult to date, as little else is written by them. However, they were likely to have been later than Dod (Hand B), due to numbering appearing

[176]Mencherini, Cau, Bianco, Loggia, Aquino, Autore, 'An extract of Apium graveolens var. dulce leaves: structure of the major constituent, apiin, and its anti-inflammatory properties.'Pp891-897: See also: A. M. Emad, S. F. Ali, E. A. Abdel-Rahman, M. R. Meselhy, M. A. Farag, S. S. Ali, E. A. Abdel-Sattar. 2005. 'Anti-inflammatory and antioxidant effects of *Apium graveolens* L. extracts mitigate against fatal acetaminophen-induced acute liver toxicity.' *Journal of Food Biochemistry*. Vol. 44. No. 10. P1-17: And: A. K. Al-Asmari, M. T. Athar, S. G. Kadasah. 2017. 'An Updated Phytopharmacological Review on Medicinal Plant of Arab Region: *Apium graveolens* Linn.' *Pharmacognosy Review*. Vol. 11. No. 21. Pp13-18. And: W. Kooti, N. Daraei. 2017. 'A Review of the Antioxidant Activity of Celery (*Apium graveolens* L.).' *Journal of Evidence-Based Complementary and Alternative Medicine.* Vol. 22. No. 4 October. Pp1029-1034: And: H. B. Sowbhagya. 2014. 'Chemistry, technology, and nutraceutical functions of celery (Apium graveolens L.): an overview.' *Critical Reviews in Food Science and Nutrition*. Vol. 54. No. 3. Pp389-98: And: W. Sukketsiri, P. Chonpathompikunlert, S. Tanasawet, N. Choosri, T. Wongtawatchai. 2016. 'Effects of *Apium graveolens* Extract on the Oxidative Stress in the Liver of Aduvant-Induced Arthritic Rats.' *Preventive Nutrition and Food Science*. Vol. 21. No. 2. June. Pp79-84. And: M. Al-Maimi, K. Yamaki, T. Masumizu, Y. Nakai, K. Saito, H. Sano, Y. Tamura. 2007. 'Superoxide Anion Radical Scavenging Activities of Herbs and Pastures in Northern Japan Determined Using Electron Spin Resonance Spectrometry.' *International Journal of Biological Sciences*. Vol. 3. No. 6. Pp349-355.

[177]Moreno Ollala (ed.), *Lelamour Herbal*. P507.

next to additions by him in between Radich and Ragworte. This particular entry is missing a temperament and is sourced by Lelamour from Macer's *De viribus Herbarum* (DVH). Olalla notes that swelling is a correct translation, but Lelamour is the only manuscript with this interpretation, the property is actually antimastitic. The latter part of the entry has also been corrected, with the scribe skipping part of the entry, and marking it 'a' to show where the entry should read from and 'b' before the start of the next entry. The reference to using eggs in even portion also appears to be a metaphor for albumen, rather than a quantity. [178]

Remedy 2 (2 entries): Annys/Anisum, Anette/Anetum

The second entry of the *Lelamour Herbal* is that of Dill (*Anethum graveolens* L.). It has been recorded as being used for lactation, a bad stomach, wind, vomiting, urination, swelling (genital), loosening the womb, as a contraceptive,[179] to debride wounds, aid boils, heal wounds, for sore eyes and hiccups (conflated), hemorrhoids, colds and headaches. This entry also notes that the herb can be a danger to sight. The only other ingredient mentioned is this entry is ale, where the herb is 'washen' and drunk for sore testicles and to make the womb 'solabill' (loose). The references to swelling, wound healing, soreness, hemorrhoids, and headaches would indicate that this entry does have anti-inflammatory properties. [180]

As with the above entry, additions for this entry have been executed by hands C and E, but with further annotations by the early Tudor hand F also present. These annotations show us how the herbal was used in the past, and give us an indication of whether the remedy has been used successfully. Hand E numbers this entry as number 2. Hand F's annotation is in agreement with the entry that the juice of 'annys' is good for removal of wind from the stomach through vomiting. Hand

[178] *Ibid.* Pp78-79, 115, 507: Appendix: 2A-L.
[179] 'stoppyth þe yate of engendir': Olalla states that the latin etymology of 'yate' gives translation of path. Thus, the phrase is discussing the path of engender, or conception. See: Moreno Ollala (ed.), *Lelamour Herbal.* P225.
[180] *Ibid.* Pp115-6, 223-5.

C notes that powder from this plant is good for 'all medicyns'.[181] The temperament for this entry is defined as hot and dry in the second degree. This is a theme within the remedies below and within the Appendix spreadsheet. A remedy using hot, dry ingredients would be acting against illnesses that were seen as cold and moist. Therefore hot, dry remedies acted as a balance or to draw them out of the body. Inflammation then, is connected to the build-up of cold, moist humours which these remedies are designed to correct.[182] The entry is based on Macer's *De viribus herbarum* and Olalla notes several differences to this entry compared to *De viribus herbarum*: 'vomyte' has been used in the place of nausea. The use for a woman's 'schappe' is missing the reference to 'matrice' (uterus/womb). The sentence referencing the use of the herb for washing testicles is also faulty, with no reference to ale in the *De viribus herbarum*, but a possible reference to warm water in 'tepida'. The use of the word testicles also appears to be an error for 'intestinorum' in the source text. The properties of the seeds for treating hiccups and the ground root against burning eyes have been amalgamated, an error that Moreno Ollala has traced to the scribe of the *Rue herbal,* due to three associated manuscripts all sharing this particular mistake.[183]

This plant appears again with the second heading Anette/Anetum, several entries later. This time its uses are listed as promoting urination, dealing with wind in the womb, hiccups, wound healing, for genital burns, hemorrhoids, lactation, for the stomach, against cold, and for the head and sinews. Again, there is the reference here to potential for sight impairment. In a similar manner to the first entry, stale ale mixed with the juice of the plant is used in the remedy, and oil is also used mixed with the plant in flour form. The temperament for the entry is the same as the first; hot and dry in the second degree. However, the sources for this entry differ: Olalla identifies use of the *Agnus castus* and a second source similar to *De viribus herbarum.* Hand E numbers this entry, but

[181]Moreno Ollala (ed.), *Lelamour Herbal*. Pp80, 115-116.

[182]*Ibid.* Pp80, 115-116: See also: Porter, *The Greatest Benefit to Mankind: A Medical History of Humanity from Antiquity to the Present,* Pp 57-58: And: Remedies 1-20.

[183]Moreno Ollala (ed.), *Lelamour Herbal.* Pp223-5: Appendix:8A-L.

unlike the first, added annotation is sparse. The uses of the plant in both entries suggest utilization against inflammation for symptoms such as soreness, pain, and to aid wound healing.[184] This is reinforced by an article found in the *Iranian Journal of Pharmaceutical Research*, which shows that modern testing has indeed found that dill is anti-inflammatory and analgesic. [185] In modern medical research dill has been found to be antioxidant, anti-inflammatory, anti-diabetic, and anti-cancer, amongst other properties. Its antioxidant properties against free radicals and superoxide anions (alongside being hypolipidemic and hypoglycemic) also mean that it can be used in controlling diabetes. [186] Dill has also been found to contain the flavonoid (plant pigment) Quercetin, which contributes to its effects.[187] Inflammation is now believed to have more of a role in diabetes than previously thought, inflammation's role in the immune system response means that controlling inflammation could play a large role in managing diabetes. In type 1 diabetes failed immune mechanisms cause T cells to emerge, which are capable of causing the destructive inflammation called insulitis (inflammation of pancreas tissue). Cytokines are also involved here, the presences of these cytokines create an increase of iNOS thus increasing stress and triggering more immune cells,

[184]*Ibid.* Pp119-20,233-4.

[185]Appendix: 3A-L. And: M. Naseri, F. Mojab, M. Khodadoost, M. Kamalinejad, A. Davati, R. Choopani, A. Hasheminejad, Z. Bararpoor, S. Shariatpanahi, M. Emtiazy. 2012. 'The Study of Anti-inflammatory Activity of Oil-Based Dill (Anethum graveolens L.) Extract Used Topically in Formalin-Induced Inflammation Male Rat Paw**.'** *Iranian Journal of Pharmaceutical Research, Vol. 11. No. 4.* Autumn. Pp1169-1174.

[186]Naseri, Mojab, Khodadoost, Kamalinejad, Davati, Choopani, Haseminejad, Bararpoor, Shariatpanahi, Emtiazy, 'The Study of Anti-inflammatory Activity of Oil-Based Dill (Anethum graveolens L.) Extract Used Topically in Formalin-Induced Inflammation Male Rat Paw.' Pp1169-1174.See also: M. Kazemi. 2015. 'Phenolic profile, antioxidant capacity and anti-inflammatory activity of Anethum graveolens L. essential oil.' *Natural Product Research*. Vol. 29. No. 6. Pp551-3: And: M. T. Goodarzi, I. Khodadadi, H. Tavilani, E. A. Oshaghi. 2016. 'The Role of *Anethum graveolens* L. (Dill) in the Management of Diabetes.' *Journal of Tropical Medicine*. Vol. 2016. Pp1-11: And: M. Akbari, M. Javadnoori, A. Siahpoosh, P. Afshari, M. H. Haghighi, E. Lake. 2016. 'Comparison the Effect of *Anethum graveolens* and Oxytocin on the Induction of Labor in Term Pregnancy: A Randomized Clinical Trial.' *Jundishapur Journal of Natural Pharmaceutical Products* Vol. 11. No. 1. Pp1-6: And: Oshaghi, Khodadadi, Tavilani, Goodarzi, 'Aqueous Extract of *Anethum Graveolens L* Potential Antioxidant and Antiglycation Effects.' Pp328-333: And: R. u. Zaman, M. S. Akhtar, M. S. Khan. 2004. 'Preliminary Evaluation of *Anethum graveolens* Fruit in Indomethacin-ulcer Induced Rats.' *Journal of Biological Sciences*. Vol. 4. No. 2. Pp151-6.

[187]Zaman, Akhtar, Khan, 'Preliminary Evaluation of *Anethum graveolens* Fruit in Indomethacin-ulcer Induced Rats.' Pp151-6.

leading to a continuing cycle which damages the pancreas.[188] Thus, potential anti-inflammatory drugs could be highly valuable here.

Additionally, it is worth noting that the fact that this plant is being studied in Iranian research citing traditional medicine and matching inflammatory usage by Lelamour to modern scholarship suggests that there could be an Arabic or Persian medicinal influence, although not explicitly stated, in the usage of the plant,especially given that the plant is not native to Western Europe, but to the Mediterranean and Southeastern Europe. [189]

Remedy 3: Avaunce/Sana Munda

The third plant being discussed is Avaunce/Sanamunda. There are two possible identifications that Olalla provides, making this entry a little trickier to deal with. These are Wood Aven (*Geum urbanum* L.) and Hare-foot Clover (*Trifolium arvense* L.). Although this entry does not mention swelling, it does discuss use in fever, comforting the stomach, digestion, cancer and wound healing. For fevers, and some cancers, anti-inflammatories can be used as treatment. They may also be useful in helping to heal wounds by preventing cell damage caused by a strong, or chronic anti-inflammatory response. The preparation given here is to powder the plant and add it to wine or water. As with Remedy 1, this remedy gives no temperament, and has been annotated by hands C and E. Hand C corrects a misspelling of a v to a u in the word 'vlake', with no further annotations for the entry.[190]

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[188]S. Tsalamandris, A. S. Antonopoulos, E. Oikonomou, G-A. P. Papamikroulis, G. Vogiatzi, S. Papaioannou, S. Deftereos, D. Tousoulis. 2019. 'The Role of Inflammation in Diabetes: Current Concepts and Future Perspectives.' *European Cardiology Review*. Vol. 14. No. 1. April, Pp50-59.

[189]Oshaghi, Khodadadi, Tavilani, Goodarzi, 'Aqueous Extract of *Anethum Graveolens L* Potential Antioxidant and Antiglycation Effects.' Pp328-333: And Naseri, Mojab, Khodadoost, Kamalinejad, Davati, Choopani, Haseminejad, Bararpoor, Shariatpanahi, Emtiazy, 'The Study of Anti-inflammatory Activity of Oil-Based Dill (Anethum graveolens L.) Extract Used Topically in Formalin-Induced Inflammation Male Rat Paw.' Pp1169-1174: and: The Editors of the Encyclopaedia Britannica. 2021. *Dill: Herb*. Available from: https://www.britannica.com/plant/dill [Accessed: 26/9/21]

[190]Moreno Ollala (ed.), *Lelamour Herbal*. Pp116, 225-6: And: Appendix: 4A-L.

There are various articles available suggesting that *Geum urbanum* (Wood Avens) has anti-inflammatory properties. Wood avens is anti-inflammatory in that it disrupts COX (Cyclo-oxygenase), NO and iNOS, which trigger inflammatory processes.[191] Additionally, Wood avens also contains anthocyanins, and proanthocyanins, which are anti-inflammatory and which disrupt cancer cells by preventing cell proliferation and inhibiting tumour growth.[192] The plant also contains antioxidants. These particular chemicals, alongside anti-inflammatory properties, appear to be a theme within the selected entries from the *Lelamour Herbal*. Antioxidants 'scavenge' particles known as free radicals. As previously discussed, their reactivity means they need removing from the body to reduce inflammation. The combination of processes this plant appears to be able to control means it could be a good potential for further research.[193]

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[191]A. E. Al-Snafi**.** 2019. 'Constituents and pharmacology of Geum urbanum –A Review.' *IOSR Journal of Pharmacy.* Vol. 9. No. 5. May. Pp28-33: See also: S. Granica, A. Kłębowska, M. Kosiński, J. P. Piwoarski, M. K. Dudek, S. Kaźmierski, A. K. Kiss. 2016. 'Effects of Geum urbanum L. root extracts and its constituents on polymorphonuclear leucocytes functions. Significance in periodontal diseases.' *Journal of Ethnopharmacology*. Vol. 21. No. 188. July. Pp1-12: and: M. Schmitt, A. A. Magid, J-M. Nuzillard, J. Hubert, N. Etgique, L. Duca, L. Voutquenne-Nazabadioko. 2020. 'Investigation of Antioxidant and Elastase Inhibitory Activities of *Geum urbanum* Aerial Parts, Chemical Characterization of Extracts Guided by Chemical and Biological Assays.' *Natural Product Communications*. Vol. 15. No. 3. Pp1-9: And: J. P. Piwowarski, S. Granica, M. Zwierzyńska, J. Stefańska, P. Schopohl, M. F. Melzig, A. K. Kiss. 2014. 'Role of human gut microbiota metabolism in the anti-inflammatory effect of traditionally used ellagitannin-rich plant materials.' *Journal of Ethnopharmacology*. Vol. 155. No. 1. August. Pp801-9: And: M. M. Zaharieva, M. Popova, T. S. Paunova-Krasteva, I. Tsvetkova, S. Stoitsova, S. M. Konstantinov, V. Bankova, H. Nadjenski, L. Dimitrova. 2017. 'Antimicrobial and antineoplastic activity of fractions derived from geum *Urbanum* L.' *4th European Biopharma Congress & 6th International Conference and Exhibition on Pharmacology and Ethnopharmacology*. Vol. 6. No. 4. November. P57. Available from: https://www.omicsonline.org/conference-proceedings/2167-065X-C1-026-003.pdf [accessed: 22/9/21]: And: Lobo, Patil, Phatak, Chandra, 'Free-radicals, antioxidants and functional foods: Impact on human health.' Pp118-126.

[192]H. E. Khoo, A. Azlan, S. T. Tang, S. M. Lim. Anthocyanidins and anthocyanins: colored pigments as food, pharmaceutical ingredients, and the potential health benefits. *Food and Nutrition Research*. Vol. 61. No. 1. 2017. Pp1-21.

[193]Al-Snafi. 'Constituents and pharmacology of Geum Urbanum – A Review. Pp28-33: See also: Granica, Kłębowska, Kosiński, Piwoarski, Dudek, Kaźmierski, Kiss, 'Effects of Geum urbanum L. root extracts and its constituents on polymorphonuclear leucocytes functions. Significance in periodontal diseases.'Pp1-12: and: Schmitt, Magid, Nuzillard, Hubert, Etgique, Duca, Voutquenne-Nazabadioko, 'Investigation of Antioxidant and Elastase Inhibitory Activities of *Geum urbanum* Aerial Parts, Chemical Characterization of Extracts Guided by Chemical and Biological Assays.' Pp1-13: And: Piwowarski, Granica, Zwierzyńska, Stefańska, Schopohl, Melzig, Kiss, 'Role of human gut microbiota metabolism in the anti-inflammatory effect of traditionally used ellagitannin-rich plant materials.' Pp801-9: And: Zaharieva, Popova, Paunova-Krasteva, Tsetkova, Stoitsova, Konstaninov, Bankova,Nadjenski, Dimitrova, 'Antimicrobial and antineoplastic activity of fractions derived from

Trifolium arvense L., (Harefoot clover) unlike Wood avens, appears to have been little studied. Despite the lack of research there are some indications that it is also antioxidant. Red clover, for example, is anti-inflammatory because it disrupts the NF-kB pathway and is also a superoxide radical scavenger.[194] Clover species seem to be antioxidant in general. The study of clovers appears to be a growing area.[195] This entry once again has been sourced from the *De viribus herbarum* and although the source itself is believed to have no impact from Arabic sources, this entry shows potential for some eastern influence.[196] One of the sources researched comes from the Iraqi scholar A. E. Al-Snafi. Iraq was part of Persia and part of the Arabic medicinal milleu, thus the fact that this plant is being researched indicates a possible eastern influence in its use despite their being no mention of this in the *Lelamour Herbal*.[197]

geum *Urbanum* L.' P57: And Lobo, Patil, Phatak, Chandra, 'Free-radicals, antioxidants and functional foods: Impact on human health.' Pp118-126.

[194]S. G. Lee, C. R. Brownmiller, S-O Lee, H. W. Kang. 2020. 'Anti-Inflammatory and Antioxidant Effects of Anthocyanins of *Trifolium pratense* (Red Clover) in Lipopolysaccharide-Stimulated RAW-267.4 Macrophages.' *Nutrients*. Vol. 12. No. 4. April. Pp1-13: and: J. Kolodziejczyk-Czepas. 2016. '*Trifolium* species – the latest finding on chemical profile, ethnomedicinal use and pharmacological properties.' *Journal of Pharmacy and Pharmacology*. Vol. 68. No. 7. July. Pp845-861.

[195]Kolodziejczyk-Czepas, '*Trifolium* species – the latest finding on chemical profile, ethnomedicinal use and pharmacological properties.' Pp845-861.: See also: Lee, Brownmiller, Lee, Kang, 'Anti-Inflammatory and Antioxidant Effects of Anthocyanins of *Trifolium pratense* (Red Clover) in Lipopolysaccharide-Stimulated RAW-267.4 Macrophages.' Pp1-13: And: A. Mouradov, G. Spangenberg. 2014. 'Flavonoids: a metabolic network mediating plants adaption to their real estate.' *Frontiers in Plant Science.* Vol. 5. November. Pp1-16: and: D. Yu, T. Huang, B. Tian, J. Zhan. 2020. 'Advances in Biosynthesis and Biological Functions of Proanthocyanadins in Horticultural Plants.' *Foods*. Vol. 9. No. 12. December. Pp1-22.

[196]Moreno Ollala (ed.). *Lelamour Herbal*. Pp116, 225-6.

[197]Al-Snafi. 'Constituents and pharmacology of Geum Urbanum – A Review.' Pp28-33.

Remedy 4: Agrymony/Agrimonia

Remedy four is Agrymony or Agrimonia. In this case Olalla's identification is more straightforward; the plant in question is Agrimony, *Agrimonia eupatoria* L, as the headings would suggest. This entry is used for an aching womb, injury by iron tools, aching sores of the spleen ('mylte'), and pesticide (fleas).[198] Aching can be a symptom of inflammation or damage and NSAID drugs are used to relieve this as it is seen as a type of pain.[199] Agrimony (*Agrimonia eupatoria L.)* appears to be a reasonably well researched plant in relation to its medicinal benefits. It is antioxidant, anti-inflammatory and analgesic (relieves pain). It also contains anthocyanins and proanthocyanins (responsible for the colour in red and purple fruit and vegetables), which are both antioxidative and antimicrobial. Its antioxidant activity allows it to scavenge free radicals and also disrupt the COX and MAPK pathways which controls gene regulation, cellular and cell survival[200] and are involved in inflammation, disrupting signaling inflammatory cytokine communication.[201] These properties combined with other chemicals within the plant work to create an anti-inflammatory effect. The plant is also anti-nociceptive: nociception is the body's response to potentially harmful stimuli, like a stubbed toe or burning heat. Whilst this is not anti-inflammatory, controlling the

[198]Moreno Ollala (ed.), *Lelamour Herbal.* Pp117, 228: See also: Appendix: 6A-L.

[199]Khayrullina, Mukhametov, Tjurina, Garifullina, Gerchikov, Zarudiy, 'Nonsteroidal Anti-Inflammatory Drugs: I. A Study of "Structure-Efficacy of the Anti-Inflammatory Effect Relationship Activity.' Pp305-312.

[200]Genentech. 2021. *Explore MAPK*. Available from: https://www.genentechoncology.com/pathways/cancer-tumor-targets/mapk.html [Accessed: 22/9/21]

[201]Khoo, Azlan, Tang, Lim, 'Anthocyanidins and anthocyanins: coloured pigments as food, pharmaceutical ingredients, and the potential health benefits.' Pp1-21: See also: T. N. Santos. G. Costa, J. P. Ferreira, J. Liberal, V. Francisco, A. Paranhos, M. T. Cruz, M. Castelo-Branco, I. V. Figueiredo, M. T. Batista. 2017. 'Antioxidant, Anti-Inflammatory, and Analgesic Activities of Agrimonia eupatoria L. Infusion.' E*vidence-Based Complementary and Alternative Medicine.* Vol. 2017. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5405390/. [Accessed: 3/5/21]: See also: D. Ivanova, D. Vankova, M. Nashar. 2013. 'Agrimonia eupatoria tea consumption in relation to markers of inflammation, oxidative status and lipid metabolism in healthy subjects.' *Archives of Physiology and Biochemistry*. Vol. 119. No. 1. February. Pp32-7: and: H. S. Correia, M. T. Batista, T. C. P. Dinis. 2007. 'The activity of an extract and fraction of Agrimonia eupatoria L. against reactive species.' *Biofactors*. Vol. 29. No. 2-3. Pp91-104: and: H. Correia, A. González-Paramás, M. T. Amaral, C. Santos-Buega, M. T. Batista. 2006. 'Polyphenolic profile characterization of Agrimonia eupatoria L. by HPLC with different detection devices.' *Biomedical Chromatography*. Vol. 20. No. 2 January. Pp88-94: And: Z. Paluch, L. Biriczová, G. Pallag, E. C. Marques, N. Vargová, E. Kmoníčková. 2020. 'The Therapeutic Effects of *Agrimonia eupatoria* L.' *Physiological Research.* Vol. 69. No. 4. Pp S555-571.

body's pain response means potentially reducing the likelihood of triggering an inflammatory response where it may not be beneficial.[202] The only ingredients listed within this entry are agrimony, and potage (or meat as an alternative). Thus, this would suggest that any benefits of this remedy, which appears promising would be coming directly from the use of the herb rather than a combination of multiple plants as in the Bald's Leechbook remedy. [203] This entry has its humours provided; hot and dry. The pattern of additions by both hands C and E repeats here. Hand E numbers this entry 5. Hand C provides a description of Agrimony comparing it to Tansy, stating its leaves are similar but greener in colour, with yellow flowers, seeds that cling to clothes and that the plant can be found in ditches, hedges and 'vales' (valleys).[204] This entry differs from those above in the above remedy, being one of a smaller number of entries that have been compiled from the *Agnus Castus* Herbal believed to have been written by Frenchman Odo de Meung.[205] In *Agnus Castus* this entry appears after Remedy 5 below.[206] Despite being from a different source there appears to be no discernible Arabic influence in this entry.[207]

[202]I. Tracey, P. Dunckley. 2004. 'Importance of anti- and pro-nociceptive mechanisms in human disease.' *Gut*. Vol. 53. No. 11. November. Pp1553-1555: And: F. A. Pinho-Ribeiro, W. A. Verri Jr, I. M. Chu. 2017. 'Nociceptor Sensory Neuron-Immune Interactions in Pain and Inflammation.' *Trends in Immunology*. Vol. 38. No. 1. January. Pp5-19.

[203]Moreno Ollala. (ed.), *Lelamour Herbal*. Pp116, 225-6: and: Appendix: 6A-L: See also: Harrison, Roberts, Gabrilska, Rumbaugh, Lee, Diggle, 'A 1000-year-old Antimicrobial Remedy with Antistaphylococcal Activity.' Pp1-7: and: Furner-Pardoe, Anonye, Cain, Moat, Ortori, Lee, Barrett, Corre, Harrison, 'Anti-biofilm efficacy of a medieval treatment for bacterial infection requires the combination of multiple ingredients' Pp1-14.

[204]Moreno Ollala (ed.), *Lelamour Herbal*. P117.

[205]Hunt Institute for Botanical Documentation, n.d.

[206]Brodin. *Agnus castus: A Middle English herbal reconstructed from various manuscripts: Edited with introduction, notes and glossary by Gosta Brodin* Pp125-8.

[207]Moreno Ollala (ed.), *Lelamour Herbal.* Pp116, 225-6: and: Appendix: 6A-L

Remedy 5: Astrologie/Aristologia

Olalla identifies Astrologie as Birthwort, either *Aristolochia longa* or *A. rotunda* L. Lelamour recommends it for various predicaments, including destroying venom and poison; to encourage birth and aid the breast; to cleanse wounds, clean teeth, gums and jaw; for the spleen, sides and fever, cramp, gout (in feet), falling evil (epilepsy), sore wombs and paralysis; most of which suggest possible anti-inflammatory properties. Astrologie is used with other ingredients; wine, honey and 'gladeyne' (Yellow Flag), water, and milk.[208] Yellow Flag appears under 'Gladoyne'/'Gladiolus' (Iris pseudacorus L), but Olalla believes the earlier entry 'Flour delice'/'Iris' which he identifies as German Flag: I. x germanica L. could also be the same plant.[209] Both entries refer to some sort of Iris. Iris species overall have been found to be antimicrobial, *anti-cancer*, anti-inflammatory and antioxidant; *Iris germanica* appears to have more of these properties than *Iris pseudocorus,* as well as more available research. Rahman et al. note that some of the anti-inflammatory components of *Iris germanica* were 'significant' in comparison to aspirin and indomethacin, which are used clinically. [210]

In terms of the main plant of concern here, Birthwort, we also have possible match with anti-inflammatory usage. There were limited sources available for information on the potential inflammatory properties of Birthwort. However, the little information that is available suggests that it is anti-inflammatory, antioxidant, radical scavenging, inhibits proteins, and reduces oxidative stress.[211]

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[208]*Ibid.* Pp118, 228-30. Appendix: 7A-M.

[209]Moreno Ollala (ed.), *Lelamour Herbal.* Pp145,300-1, 311-2: Appendix: 29A-l;35A-L.

[210]Moreno Ollala (ed.), *Lelamour Herbal*. Pp118, 228-30. Appendix: 7A-M: and: A-u-Rahman, S. Nasim, I. Baig, S. Jalil, I. Orhan, B. Sener, M. I. Choudhary. 2003. 'Anti-inflammatory isoflavonoids from the rhizomes of *Iris germanica*.' *Journal of Ethnopharmacology*. Vol. 86. Pp177-180: And: I, Crişan, M. Cantor. 2016. 'New Perspectives on Medicinal Properties and Uses of Iris SP. *Hop and Medicinal Plants* Vol. 24. No. 1-2. Pp24-36.

[211]N. Merouani, B. Belhattab, F. Sahli. 2019. 'Evaluation of the Biological Activity of Aristolochia Longa L. Extracts.' *International Journal of Pharmaceutical Sciences and Research.* Vol. 8. No. 5. May. Pp1978-1992: See also: N. E. Omari, K. Sayah, S. Fettach, O. E. Blidi, A. Bouyahya, M. E. A. Faouzi, R. Kamal, M. Barkiyou. 2019. 'Evaluation of *In vitro* Antioxidant and Antidiabetic Activities of *Aristolochia longa* Extracts.' *Evidence-Based Complementary and Alternative Medicine*. Vol. 2019. Pp1-9: And: T-S. Wu. A. G. Damu, C-R. Su, P-C. Kuo. 2004. 'Terpenoids of *Aristolochia* and their biological activities.' *Natural Product Reports*. Vol. 21. Pp594-624: See also: Remedy 1.

Olalla's second option for Astrologie, *Aristolochia rotunda*, does not appear to be anti-inflammatory in available studies, which are limited. This is likely due to the toxicity of aristolochic acid and AAN (Aristolic acid nephropathy) risk. AAN has been seen particularly in Balkan and Asian populations due to the prevalence of aristolochia in medicine or contaminated food. The condition was also reported in Belgian patients showing malignancies after taking slimming pills contain aristolochia. AAN can cause malignancies (cancer) in the cells that line the urethra, bladder, and renal (kidney) area of the pelvis, as well as a form of kidney inflammation that can lead to kidney failure. These indications mean that the plant is a poor research target, due to its toxic effects [212]

As in the previous entry, humours are defined as hot and dry, but this time with the addition of being 'second degree'.[213] Following the theme of annotation again, this entry is annotated by hands C and E. Hand E numbers this entry 6. Hand C makes several annotations here, noting that astrologie can be used both internally and externally on wounds, providing a comparative description of the plant to 'burre' and 'clotte' leaves and 'cleped' galingale, and adding that drunk in warm water it acts as a deoppilant for the chest, aids falling evil, gout in the foot, and cramp. Hand C also notes it should be gathered in harvest.[214]

This entry has been compiled from two sources, the *De viribus herbarum* and the *Agnus Castus*. In the *Agnus Castus*, two species of *Aristolochia* are dealt with separately, whereas only one is presumably used in the *Lelamour Herbal*. *A. longa* is given as a liver deoppilant, for use against wind, venom, sores and rotting wounds. The use of the name Galingale as an alternative suggests

[212]Hosseinkhani, Falahatzadeh, Raoofi, Zarshenas, 'An Evidence-Based Review on Wound Healing Herbal Remedies From Reports of Traditional Persian Medicine' Pp334-343: and: F. D. Debele, J-L, Vangerweghem, J. L. Nortier. 2008. 'Aristolochic acid nephropathy: a worldwide problem.' *Kidney International*. Vol. 74. No. 2 July.Pp158-69. See also: T. Tomlinson, A. Fernandes, A. P. Grollman. 2020. '*Aristolochia* Herbs and Iatrogenic Disease: The Case of Portland's Powders.' *Yale Journal of Biology and Medicine*. Vol. 93. No. 2. June. Pp355-363: and: M. H. Hashempur, F. Khademia, M. Rahmanifard, M. M. Zarshenas. 2017. 'An Evidence-Based Study on Medicinal Plants for Hemorrhoids in Medieval Persia.' *Journal for Evidence-Based Complementary and Alternative Medicine.* Vol. 22. No. 4. October. Pp969-981.

[213]Moreno Ollala (ed.), *Lelamour Herbal.* Pp118, 228-30: and: Appendix:7A-L.

[214]*Ibid.* P118.

potential confusion or lack of differentiation between plants.[215]. *A. rotunda* is given as a deoppilant of the chest, for falling evil, podagra, and cramp. There is also potential in this source for a small amount of Arabic or Eastern influence.[216]

Remedy 6: Betayne/Betania

As the name may suggest, this plant has been identified as Betony (*Stachys officinalis* L. or *Betonica officinalis*). Several uses in this entry suggest possible anti-inflammatory properties; use against a variety of aches, as well as cough, fever and headache.[217] As with many of the remedies, research shows that Betony is both antioxidant and anti-inflammatory and it appears that these two properties act in tandem to lower inflammation. Paun et al. examined Betony alongside Touch-me-not balsam (*Impatiens noli-tangere*) stating that inflammatory diseases are becoming more prevalent and therefore alternatives to the traditional NSAID drugs, and a wider selection of drugs are needed. The study identifies that the combination of anti-inflammatory and antioxidant activity is needed for efficient healing, and this would account for why many of the remedies above and below have this combination of properties.[218] The plant contains anthocyanidins, disrupts COX, and scavenges radicals (tackling inflammation at multiple stages). Betony also inhibits the LOX (Lipoxegenase) pathway, which controls cell proliferation, differentiation, and the regulation of apoptosis (cell death). If LOX goes wrong, it contributes to diseases such as cancer that are caused by faulty cell processes.[219] Betony is also antinociceptive, analgesic (pain relieving) and has a low

[215]*Ibid*. Pp118, 228-30: and: Brodin. *Agnus castus: A Middle English herbal reconstructed from various manuscripts: Edited with introduction, notes and glossary by Gosta Brodin*. Pp125-6, 208.
[216]Hashempur, Khademia, Rahmanifard, Zarshnas, 'An Evidence-Based Study on Medicinal Plants for Hemorrhoids in Medieval Persia.'. Pp969-981. And: Hosseinkhani, Falahatzadeh, Raoofi, Zarshenas, 'An Evidence-Based Review on Wound Healing Herbal Remedies From Reports of Traditional Persian Medicine' Pp334-343.
[217]Moreno Ollala (ed.), *Lelamour Herbal*. Pp121-2, 236-40. See also: Appendix: 8A-L.
[218]Paun, Neagu, Moroneau, Albu, Ursu, Zanfirescu, Negres, Chirita, Radu, 'Anti-inflammatory and antioxidant activities of the Impatiens noli tangere and Stachys officinalis polyphenolic rich extracts.' Pp57-64.
[219]P. Vishnupriya, A. Aparna, V. P. Viswanadha. Lipoxygenase (LOX) Pathway: A Promising Target to Combat Cancer. *Current Pharmaceutical Design*. Vol. 27. No. 31. 2021. Pp3349-3369.

toxicity. It could also be a target for anti-microbial drugs, as it contains flavonoids that prevent bacterial growth and function. Betony's anti-inflammatory and anti-bacterial properties are perhaps not very well known and exactly how the plant's constituents work is not wholly understood. [220]

The temperament for this entry is given as cold and Hands C and E appear again for this entry. Hand E numbers this entry 12. Hand C however is more active making a number of additions, noting that in some books Betony is listed as hot and dry (Olalla also identifies the given temperament as scribal error), bruised with salt and applied to the nostrils nosebleeds could be staunched, made into a plaster with wine it could be used against penile swelling. Hand C also adds that it can be used for the eye, fever, stones and dropsy. A more recognizable spelling of Betany has also been added in the margin. This entry has been drawn from the *De viribus herbarum.* Olalla notes that this plant was particularly popular in the medieval period, and despite the lack of description the properties given suggest his identification is correct. 'Empetik' is also an error which should mean hemoptysis, spitting blood. The reference to fever should actually be in connection with stomach-ache. There are several other faulty passages in this entry, where the entry discusses uses for the womb is a badly rendered translation that should deal with the kidneys. The added reference to 'eyen' is also a copy mistake. [221]

[220]Paun, Neagu, Moroneau, Albu, Ursu, Zanfirescu, Negres, Chirita, Radu, 'Anti-inflammatory and antioxidant activities of the Impatiens noli tangere and Stachys officinalis polyphenolic rich extracts.' Pp57-64: See also: C. M. Uritu,C. T. Mihai,G-D. Stanciu,G. Dodi,T. Alexa-Stratulat,A. Luca,M-M Leon-Constantin,R. Stefanescu,V. Bild,S. Melnic,B. I. Tamba. 2018. 'Medicinal Plants of the Family Lamiaceae in Pain Therapy: A Review. *Pain Research and Management*. Vol. 2018. Pp1-44: and: G. Paun, E. Neagu, V. Moroeanu, O. Ungureanu, R. Cretu, E. Ionescu, C. E. Tebrencu, R. Ionescu, I. Stoica, G. L. Radu. 2017. 'Phytochemical analysis and in vitro biological activity of *Betonica officinalis* and *Salvia officinalis* extracts.' *Romania Biotechnological Letters*. Vol. 22. No. 4. Pp12751-61.

[221]Moreno Ollala (ed.), *Lelamour Herbal*. Pp121-122, 236-40. Appendix: 9A-L,

Remedy 7 (2 entries): Beata/Beatis, Oynowne,

Allium cepa L. or Onion is repeated in Lelamour under the names above; the first entry being Beata/Beatis and the second, Oynowne.[222] In the first entry we have a contradiction:

…some lechis seiþ that hit swelliþ þe hede.[223]

Despite the possibility it may cause the head to swell, it is later given as a remedy to stop swelling caused by heat. The second entry is more extensive than the former. In this entry, anti-inflammatory properties are suggested by its use against the 'bolwyng' or swelling caused by a hound's bite, against adder bites, toothache, and haemorrhoids, dropsy.[224] Onion is one of the most familiar plants of the herbal, regularly used in modern cuisine. Onion inhibits the NFkB pathway and the STAT-1 gene, (which provides instruction for building a protein that plays a role in the immune system). It reduces pro-inflammatory cytokines that trigger much of the inflammatory process once they are secreted by immune cells. Onion also contains flavonoids such as quercetin. Inhibitory and anti-inflammatory properties can be used to control allergic asthma, acting as an anti-allergy drug through preventing inflammation. Onion is also antioxidant and immunomodulatory. Its properties mean that it reduces the inflammatory cascade and oxidative stress that can cause serious damage to the body.[225] The only other plant referenced in this entry is Rue (*Ruta graveolens*) which has been found

[222]Moreno Ollala (ed.) *Lelamour Herbal.* Pp123, 240-3, 181-2, 385: Appendix: 10A-L, 64A-L,
[223]*Ibid*. Pp123, 240-3, 181-2, 385: Appendix: 10A-L, 64A-L.
[224]*Ibid*. Pp123, 240-3, 181-2, 385: Appendix: 10A-L, 64A-L. Dropsy is a form of oedema: swelling with fluid.
[225] J-M. Zhang, J. An. 2007. 'Cytokines, Inflammation and Pain.' *International Anesthesiology Clinics*. Vol. 45. No.2. Spring. Pp27-37: And U. F. Umoh, A. R. Umoh, O. J. Enema, E. Ekpo, K. K. Ajibesin, O. A. Eseyin, 'Anti-Inflammatory Constituents of Plants: A Review', Pp74-85.: See also: T. T. Oliveira,K. M. Campos,A. T. Cerqueira-Lima,T. C. B. Carneiro,E. da S. Velozo,I. C. A. R. Melo,E. A. Figueiredo,E. de J. Oliveira,D. F. S. A. de Vasconcelos,L. C. Pontes-de-Carvalho,N. M. Alcântara-Neves, C. A. Figueiredo. 2015. 'Potential therapeutic effect of *Allium cepa*. L. and Quercetin in a murine model of *Blomia tropicalis* induced asthma.' *DARU Journal of Pharmaceutical Sciences*. Vol. 23. No. 1. P1-12: and: N. Marefati, V. Ghorani, F. Shakeri, M. Boskabady, F. Kianian, R. Rezaee, M. H. Boskabady. 2021. 'A review of anti-inflammatory, antioxidant, and immunomodulatory effects of *Allium cepa* and its main constituents.' *Pharmaceutical Biology.* Vol. 59. No. 1. Pp287-302: And: A. Z. El-Hashim, M. A. Khajah, K. Y. Orabi, S. Balakrishnan, H. G.Sary, A. A. Abdelali. 2020. 'Onion Bulb Extract Downregulates EGFR/ERK1/2/AKT Signalling Pathway and Synergizes With Steroids to Inhibit Allergic Inflammation.' *Frontiers in Pharmacology*. Vol. 11. October. Pp1-18: And: M. Michalak-Majewska, U. Złotek, U. Szymanowska, D. Szwajgier, P. Stanikowski, M. Matysek, A. Sobota. 2020. 'Antioxidant

to be antinociceptive, anti-inflammatory and anti-pyretic and was also found to be non-toxic at high levels in mice. Previously mentioned processes and chemicals such as COX, prostaglandins, TNF-a, and cytokines are all managed by this plant, thus creating the aforementioned effects like in many of the other remedies discussed.[226]

Both entries referring to onion are annotated. The first entry discussing onion has been annotated by hand C and E. Hand E numbers this entry as 13. Hand C provides 2 alternate spellings; 'Beta' and 'bete', and also notes that the plant is useful against nits and other pests.

The second entry has the small addition of 'cepe' by the more uncommon hand D, and hand E provides the entry's number, 141. Only the latter entry, however, gives humour and degree; hot in the third degree, and moist in the fourth. Both entries have been identified by Olalla as originating in *De viribus herbarum*, and there is once again no clear Arabic influence to this entry.[227]

and Potentially Anti-inflammatory Properties in Pasta Fortified with Onion Skin.' *Applied Sciences*. Vol. 10. Pp1-14.

[226]F. Loonat, G. J. Amabeoku. 2014. 'Antinociceptive, Anti-Inflammatory and Antipyretic Activities of the Leaf Methanol Extract of *Ruta Graveolens* L. (Rutaceae) in Mice and Rats.' *African Journal of Traditional, Complementary and Alternative Medicines*. Vol 11. No. 3. Pp173-181.

[227]Moreno Ollala(ed.). *Lelamour Herbal*. Pp123, 240-3, 181-2, 385: Appendix: 10A-L, 64A-L.

Remedy 8: Bugula/Brown Bugill

As the name may indicate, this entry refers to Bugle (*Ajuga reptans* L.), a plant often found in lawns. This is a relatively brief entry, and anti-inflammatory properties are suggested by its usage in wound healing, catarrh or rheume in the head, stoppings of the head and aching.[228] Available research shows that, like many of the plants discussed, it is both anti-inflammatory and antioxidant. It works by reducing NO synthesis, disrupting the COX pathways, and the NFkB pathway. As it disrupts or down-regulates the various pathways mentioned, Bugle tackles inflammation by preventing the production of inflammatory cells and proteins.[229] There are potential benefits of natural medicine in comparison to NSAID treatments; natural medicines, in many cases, can have fewer side effects than those that are synthetic.[230] This entry has been annotated by hand E, numbering it 16. Hand C also annotates with a description and comparison to selfheal, adds 'dronke' after 'erbe' on line 225 indicating a method of drug delivery. The final addition for line 227 adding it can be used for broken bones of the head. The humours listed for this entry are as hot and dry following the theme of most of the entries. Again following theme the source of this entry is the *De viribus herbarum* with no clear Arabic influence**.**[231]

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[228]Moreno Ollala (ed.), *Lelamour Herbal*.Pp124, 244-5: Appendix: 10A-L

[229]A. Toiu, A. Mocan, L. Vlase, A. E. Pârvu, D. C. Vodnar, A. Gheldiu, C. Moldovan, I. Oniga. 2019. 'Comparative Phytochemical Profile, Antioxidant, antimicrobial and In Vivo Anti-Inflammatory Activity of Different Extracts of Traditionally Used Romanian Ajuga genevensis L. and A. Reptans L. (Lamiaceae).' Molecules. Vol. 24. No. 8. Pp1-21: See also: Y. Sun, D-L, Zhao, Z-X. Liu, X-H. Sun, Y. Li. 'Beneficial effect of 20-hydroxyecdysone exerted by modulating antioxidants and inflammatory cytokine levels in collagen-induced arthritis: A Model for rheumatoid arthritis.' *Molecular Medicine Reports*. Vol. 15. No. 5. Pp6162-6169.

[230]Sun, Zhao, Liu, Sun, Li, 'Beneficial effect of 20-hydroxyecdysone exerted by modulating antioxidants and inflammatory cytokine levels in collagen-induced arthritis: A Model for rheumatoid arthritis.' Pp6162-6169: And: T. Esposito, F. Sansone, G. Auriemma, S. Franceschelli. M. Pecoraro, P. Picerno, R. P. Aquino, T. Mencheri. 2020. 'Study on *Ajuga reptans* Extract: A Natural Antioxidant in Microencapsulated Powder Form as an Active Ingredient for Nutraceutical or Pharmaceutical Purposes.' *Pharmaceutics*. Vol. 12. No. 7. July. Pp1-23: And: R. D. Paola, E. Esposito, E. Mazzon, L. Riccardi, R. Caminiti, R. D. Toso, G. Pressi, S. Cuzzocrea. 2009. 'Teupolioside, a polypropanoid glycosides of Ajuga reptans, biotechnologically produced by IRBN22 plant cell line, exerts beneficial effects on a rodent model of colitis.' *Biochemical Pharmacology*. Vol. 77. No. 5. March.Pp845-57: and: NCATS. N.d. *Teupolioside.* Available from: https://drugs.ncats.io/substance/88458S9198 [Accessed: 22/9/21]

[231]Moreno Ollala, (ed.), *Lelamour Herbal.* Pp124, 244-5: and: Appendix: 10A-L.

Remedy 9: Bornete-is/Burneta

In this entry Lelamour refers to two plants, although it is not clear whether one should be favoured over the other. One type grows in meadows and the other on hard ground. Olalla has identified these as Burnets (*Sanguisorba*), the former being *S. officinalis* L. and the latter *S minor* Scop (aka. *Poterium sanguisorba* L.). Multiple uses are provided, from destroying humours and acting as a laxative, to uses indicative of possible anti-inflammatory properties, such as relieving soreness under the ribs and breasts.[232] Great Burnet (*S. officinalis*) is not only anti-inflammatory and anti-oxidant (radical scavenger), but anti-cancer too. This particular plant blocks NOS production and PGE2 (a type of prostaglandin – an inflammatory protein) and also holds immunoregulatory properties. It is also neuroprotective in relation to oxidative stress, meaning that it protects neurons from damage caused from too much exposure to oxygen. As previously mentioned, it is also anti-cancer; it is cytotoxic so it can kill cancer cells, meaning it can also help control or reduce tumour growth. Its inflammatory properties also contribute to this, as cancer is caused largely by the inflammatory process within cells corrupting. Great burnet inhibits cytokines, which can trigger inflammation. It also disrupts or inhibits NFkB, STAT-1, TNF and INF, ROS, processes that have already been discussed, all of which help to control inflammation.[233] The N-BUOH fraction that Su et al. discuss is suggested to be promising for inflammatory medicine. [234] The plant's properties also make it anti-allergy, as allergic reactions are inflammatory in nature. Burnet's properties in cytokine

[232]*Ibid.* Pp124-5, 245-6: Appendix: 12A-L.

[233]X. D. Su, I. Ali, M. Arooj, Y. S. Koh, S. Y. Yang, Y. H. Kim. 2018. 'Chemical constituents from *Sanguisorba officinalis* L. and their inhibitory effects of LPS-stimulated pro-inflammatory cytokine production in the bone marrow-derived dendritic cells.' *Archives of Pharmaceutical Research*. Vol. 41. Pp497-505: and: X. D. Su, R. H. Guo, H. X. Li, J. Y. Ma, Y. R. Kim. Y. H. Kim, S. Y. Yang. 2018. 'Anti-allergic inflammatory components from *Sanguisorba officinalis* L.' *Bioorganic & Medicinal Chemistry Letters*. Vol. 28. Pp2210-16: And: S. Lachowicz, J. Oszmiański, A. Rapak, I. Ochmian. 2020. 'Profile and Content of Phenolic Compounds in Leaves, Flowers, Roots and Stalks of *Sanguisorba officinalis* L. Determined with the LC-DAD-ESI-QTOF-MS/MS Analysis and Their In Vitro Antioxidant, Antidiabetic, Antiproliferative Potency. *Pharmaceuticals*.' Vol. 13. Pp1-23.

[234]Su, Ali, Arooj, Koh, Yang, Kim, 'Chemical constituents from *Sanguisorba officinalis* L. and their inhibitory effects of LPS-stimulated pro-inflammatory cytokine production in the bone marrow-derived dendritic cells.' Pp497-505.

regulation means that it blocks the IL4 interleukin which regulates immunity,[235] reducing the body's immune and therefore inflammatory response. [236]

Salad (or Small) Burnet (*S. minor* Scop/*Poterium sanguisorba* L.) is also antioxidant and anti-inflammatory with potential for use in Alzheimers treatment.[237] It is also *anti-cancer*, causing apoptosis (cell death) in cancer cells. It also contains anthocyanins[238] and flavonoids, such Quertecin, kaempfaerol and ellagic acid which are anti-inflammatory, antioxidant (creates oxidative stability), immunomodulatory and cytotoxic (kills cells).[239] In this entry we see annotation by hand E only (number 17), and temperament is not provided. The source of Lelamour's information on Burnet has been identified by Olalla as the *Agnus Castus* entry Burneta or Burnet, which it stays quite close to. The plant is identified as having blue flowers, rather than the correct red or pink colour, and are different to 'heyhofe' despite the comparison. [240]

[235]S. P. Gadani, J. C. Cronk, G. T. Norris, J. Kipnis. 2012. 'Interleukin-4: A Cytokine to Remember.' *Journal of Immunology.* Vol. 18. No. 9. November. Pp4213-4219.

[236]Su, Ali, Arooj, Koh, Yang, Kim, 'Chemical constituents from *Sanguisorba officinalis* L. and their inhibitory effects of LPS-stimulated pro-inflammatory cytokine production in the bone marrow-derived dendritic cells.' Pp497-505: and: Su, Guo, Li, Ma, Kim, Kim, Yang, 'Anti-allergic inflammatory components from *Sanguisorba officinalis* L.'Pp2210-16: And: Lachowicz, Oszmiański, Rapak, Ochmian, 'Profile and Content of Phenolic Compounds in Leaves, Flowers, Roots and Stalks of *Sanguisorba officinalis* L. Determined with the LC-DAD-ESI-QTOF-MS/MS Analysis and Their In Vitro Antioxidant, Anti-diabetic, Antiproliferative Potency' Pp1-23.

[237]Lachowicz, Oszmiański, Rapak, Ochmian, 'Profile and Content of Phenolic Compounds in Leaves, Flowers, Roots and Stalks of *Sanguisorba officinalis* L. Determined with the LC-DAD-ESI-QTOF-MS/MS Analysis and Their In Vitro Antioxidant, Anti-diabetic, Antiproliferative Potency' Pp1-23.

[238]See remedy 4, anthocyanins.

[239]C. Ceccanti, M. Landi, G. Rocchetti, M. B. M. Moreno, L. Lucini, L. Incrocci, A. Pardossi, L. Guidi. 2019. 'Hydroponically Grown *Sanguisorba minor* Scop.: Effects of Cut and Storage on Fresh-Cut Produce.' *Antioxidants*. Vol. 8. No. 12. December. Pp1-15: and: A. C. Karkanis, Â. Fernandes, J. Vaz, S. Petropoulos, E. Georgious, A. Ciric, M. Sokovic, T. Oludemi, L. Barros, I. C. F. R. Ferreira. 2019. 'Chemical composition and bioactive properties of *Sanguisorba minor* Scop. Under Mediterranean growing conditions.' *Food and Function*. Vol. 10. Pp1340-1351: and: T. C. Finimundy, A. Karkanis, Â. Fernandes, S. A. Petropoulos, R. Calhelha, J. Petrović, M. Soković, E. Rosa, L. Barros. 2020. 'Bioactive properties of *Sanguisorba minor* L. cultivated in Greece under different fertilization regimes.' *Food Chemistry*. Vol. 327. Pp1-8: See also: J. Szalay. 2015. *What Are Flavonoids?*. Available from: https://www.livescience.com/52524-flavonoids.html [Accessed: 22/9/21]

[240]Moreno Ollala (ed.), *Lelamour Herbal.* Pp124-5, 245-6. Appendix: 11A-L: And: Brodin. *Agnus castus: A Middle English herbal reconstructed from various manuscripts: Edited with introduction, notes and glossary by Gosta Brodin*. Pp137.

Remedy 10: Basilica/Basilicon

This particular entry shows us the difficulties of working with a medieval source: although Olalla has established that this remedy relates to Basil, the exact species is unclear meaning we can only guess as to which was intended for use.[241] The remedy recommends basil for mood, quaking, suspicion, comfort, burned colour, to warm a cold stomach, comfort the brain, aid sleep, swelling, sore eyes, to calm the stomach, aid appetite, to treat heart disease, and black colour, as well as to reduce post blood-letting swelling, and aid sight. For those of a phlegmatic disposition it is recommended to loosen blockages in and provide comfort to the brain. No other ingredients are given in this remedy. [242] Basil as a species has been fairly widely studied and much like onion (see remedy 7) is a familiar kitchen item. *Ocimum basilicum* seems to be one of the more researched plants of the species. Basil is anti-inflammatory, and as with many of the above plants disrupts NO, iNOS, COX2, LOX, PGE2, MMP which are enzymes involved in cytokine inactivation, influencing inflammation.[243] Basil also reduces nephrotoxicity, a deterioration of the kidney from toxic substances and oxidative stress.[244] Constituents of the plant suppress cytokines, making it immunomodulatory. Basil also blocks NFkB activation meaning cytokine production and cell survival is lowered. The reduction of inflammatory prostaglandins (PGE2) prevents cartilage degradation. It also blocks macrophage infiltration into adipose tissue. In Purple Basil, the anthocyanidins that provide its colour also scavenge radicals, reducing inflammation caused by oxygen damage.[245] This entry appears to have annotation

[241]Olalla identifies 3 types often distinguished in the medieval period: 2 are probably cultivars of O. basilicum, the third is possibly O. minimum: Moreno Ollala (ed.), *Lelamour Herbal*. Pp250.
[242]Moreno Ollala (ed.) *Lelamour Herbal*. Pp126, 250-2: Appendix: 14A-L.
[243]P. V. Lint, C. Libert. 2007. 'Chemokine and cytokine processing by matrix metalloproteinases and its effects on leukocyte migration and inflammation.' *Journal of Leukocyte Biology*. Vol. 82. December. Pp1375-1381.
[244]M. S. Al-Naimi, H. A. Rasheed, N. R. Hussien, H. M. Al-Kuraishy, A. I. Al-Gareeb. 2019. 'Nephrotoxicity: Role and significance of renal biomarkers in the early detection of acute renal injury.' *Journal of Advanced Pharmaceutical Technology and Research*. Vol. 10. No. 3. July-September. Pp95-99
[245], Złotek, Karaś, Baraniak, 'Anti-inflammatory and antioxidative activity of anthocyanins from purple basil leaves induced by selected abiotic elicitors.' Pp71-7: See also: P. Raina, M. Deepak, C. V. Chandrasekaran, A. Argwal, N. Wagh, R. Kaul-Ghanekar. 2016. 'Comparative analysis of anti-inflammatory activity of aqueous and methanolic extracts of Ocimum basilicum (basil) in RAW264.7, SW1353 and human primary chondrocytes in respect of the management of osteoarthritis.' *Journal of Herbal Medicine*, Vol 6. Pp 28-36: And: Umoh,Umoh, Enema, Ajobesin, Eseyin. 2019. 'Anti-Inflammatory Constituents of Plants: A Review.' *Journal of Chemical and*

by only one individual, hand E. Its temperament is defined as hot in the first degree and dry in the other. This entry is also interesting due to the fact it is one of a number in the *Lelamour Herbal* that have come from an untraced source, thus we do not know if this is simply an entry from a source that has since been lost or perhaps something written or heavily doctored by Lelamour himself. Olalla groups this into U1 in his commentary, these are the only entries with unidentified sources that have a Latin heading and a full temperament, but do not have Middle English names or a description of the plant.[246]

Remedy 11: Crasse

The next entry is that of Crasse: Garden Cress (*Lepidium Sativum* L.). Many uses are given for this herb, including the enhancing of lechery, healing carbuncles ('antracas') and boils ('vncomes') and abortion as well as uses that would suggests some anti-inflammatory potential. It is used to relieve aching caused by carbuncles and boils as well as toothache. Cress is used in this entry with a small number of other ingredients; meal, vinegar ('aysell'), boar's grease, goose grease and goats' milk, depending on the issue that needs tackling. The phrase 'evill of þe þhiesse' – evil of the thighs – suggests it may indicate some form of pain, in which case anti-inflammatory properties may be useful here. The first part of the entry that deals with carbuncles, boils, and toothache, refers to cress seed. The sentence on abortion, and venom, the later sentence on thighs and the final parts of the passage discussing its use for mites, ticks (of the head: lice), breast and 'sowbliþ' do not mention

Pharmaceutical Research. Vol. 11 No. 3. 2019. Pp74-85: See also: H. Takeuchi, C. Takashi-Muto, M. Nagase, M. Kassai, R. Tanaka-Yachi, C. Kiyose. 2020. 'Anti-inflammatory Effects of Extracts of Sweet Basil (Ocimum basilicum L.) on a Co-culture of 3T3-L1 Adipocytes and RAW264.7 Macrophages.' *Journal of Oleo Science*. Vol. 69. No. 5. Pp487-493: and: A. A. 'lam Kamyab, A. Eshraghian. 2013. 'Anti-Inflammatory, gastrointestinal and hepatoprotective effects of Ocimum sanctum Linn: an ancient remedy with new application.' *Inflammation & Allergy Drug Targets*. Vol. 12. No. 6. December. Pp378-84: and: and: N. Eftekhar, A. Moghimi, N. M. Roshan, S. Saadat, M. H. Boskabady. 2019. 'Immunomodulatory and anti-inflammatory effects of hydro-ethanolic extract of *Ocimum basilicum* leaves and its effect on lung pathological changes in an ovalbumin-induced rat model of asthma.' *BMC Complementary Medicine and Therapies*. Vol. 19. Pp1-11.

[246]Moreno Ollala (ed.), *Lelamour Herbal*. Pp22-3, 126, 250-2: Appendix: 14A-L.

seeds specifically, although Olalla identifies that the word 'sowbliþ' appears to be an error for sowblis from DVH's word solibles[247]). He infers that cress seeds were softened for use in the stomach, meaning that the remedy is not for a cough as stated, and this would indicate that perhaps it is the seed used throughout the entry rather than the plant.[248] However, if the plant was used, it has been identified as anti-inflammatory (moderate anti-inflammatory activity for acute and chronic inflammation), anticarcinogenic, anti-proliferative, radical scavenging, cytotoxic, anti-oxidant, analgesic, hepatoprotective, and anti-rheumatic. VEGF (Vasular endothelial growth factor) found in Land Cress is used in some acute inflammatory skin disorders, as it promotes growth of new blood vessels which allow immune cells better access to effected areas. This particular cress also prevents tumour metastasis: the extracts downregulate genes in HaCaT cells[249] that cause inflammation, therefore preventing progression. As in many of the above studies we see repeating anti-inflammatory constituents such as tannins, flavonoids, glycosides, alkaloids, and phenolic compounds (Quercetin, kaempferol appear again here). Another repeating pattern in the inhibition of prostaglandins, modulation of mediators with receptors and blocking receptors in order to reduce inflammation. Another aspect of controlling inflammation is that in doing so diseases such as diabetes (and insulin management) could be made more manageable: Oxidative stress is involved in glucose metabolism imbalances, and therefore connected to inflammation. By inhibiting the TNFa cytokine through the NFkB pathway insulin resistance for type 2 diabetes can be reduced. [250]

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[247]Moreno Ollala (ed.) *Lelamour Herbal.* P254.

[248]*Ibid.* Pp127, 252-4: Appendix: 15A-L.

[249]Human keratinocyte (skin) immortalized in order to be used in scientific testing: See: M. Türkoglu, S. Kiliç, E. Pekmezci, M. Kartal. 2018. 'Evaluating Antiinflammmatory and Antiandrogenic Effects of Garden Cress (Lepidium sativum L.) in HaCaT cells.' Records of Natural Products. Vol. 12. No. 6. Pp595-601

[250]Türkoglu, Kiliç, Pekmezci, Kartal, 'Evaluating Antiinflammmatory and Antiandrogenic Effects of Garden Cress (Lepidium sativum L.) in HaCaT cells.' Pp595-601: See also: F. Y. Alqahtani, F. S. Aleanizy, A. Z. Mahmoud, N. N. Farshori, R. Alfaraj, E. S. Al-Sheddi, I. A. Alsarra. 2019. 'Chemical composition and antimicrobial, antioxidant, and anti-inflammatory activities of *Lepidium sativum* seed oil.' *Saudi Journal of Biological Sciences.* Vol. 26. No. 5. July.Pp1089-1092: And: V. Dixit Jr III, I. Kumar, K. Palandurkar, R. Giri, K. Giri. 2020. 'Lepidium sativum: Bone healer in traditional medicine, an experimental validation study in rats.' *Journal of Family Medicine and Primary Care*. Vol. 9. No.2. February. Pp812-818: and: N. D. Raval, B. Ravishankar, B. K. Ashok. 2013. 'Anti-inflammatory effect of Chandrashura (*Lepidium sativum* Linn.) an experimental study. *Ayu*. Vol. 34. No. 3. July-September. Pp302-4: And: I. L'hadj, R. Azzi, F. Lahfa, E. A. Koceir, N. Omari. 2019. 'The nutraceutical potential of *Lepidium sativum L.* seed flavonoid-rich extract in managing metabolic syndrome components.' *Journal of*

The entry for cress has annotations from three hands; it has been numbered 23 by hand E; Hand C has added 'Nasturcium', this could be an alternate name for the plant or possibly a reference to either watercress (*Nasturtium officinale*[251]) or the garden plant, nasturtium (*Tropaeolum majus*), both of which are peppery in flavour.[252] There is also a spelling alteration by the surgeon Richard Dod on line 308, changing 'baryes' to 'bawes'. The temperament is once again hot and dry, and the source the *De viribus herbarum*. Olalla notes that the correct translation of 'hansith lecherye' should actually mean that the plant is acts as an anaphrodisiac. The anthrax discussed in the entry combined with the mention of facial 'vncomes' suggests skin anthrax. The abortive property should actually refer to the removal of worms, rather than a foetus. [253]

Food Biochemistry. Vol. 43. Pp1-11: and: A. Ahmad, B. L. J. M. Raish, K. M. Alkharfy, A. Ahad, A. Khan, M. A. Ganaie, M. A. A. Hamidaddin. 2018. 'Inhibitory effects of *Lepidium sativum* polysaccharide extracts on TNF-α production in *Escherichia coli*-stimulated mouse.' *3 Biotech* Vol. 8. No. 6. June. Pp1-8: and: J. J. Swaroop, D. Rajarajeswari, J. N. Naidu. 2012. 'Association of TNF-α with insulin resistance in type 2 diabetes mellitus.' *Indian Journal of Medical Research*. Vol. 135. No. 1. January. Pp127-130.

[251]Gardeners' World.com. 2021. *Nasturtium officinale*. Available from: https://www.gardenersworld.com/plants/nasturtium-officinale/ [Accessed: 23/9/21]

[252]Gardeners' World.com. 2021. *How to grow nasturtiums*. Available from: https://www.gardenersworld.com/how-to/grow-plants/how-to-grow-nasturtiums/ [Accessed: 23/9/21]

[253]Moreno Ollala (ed.), *Lelamour Herbal*. Pp127, 252-4.

Remedy 12: Celedony

This section deals with both Greater and Lesser Celandine, *Chelidonium majus* L and *Ranunculus ficaria* L. respectively.[254] However, it does not state which is preferred, only that both are good for the eyes. There is only one use in the entry that may suggests anti-inflammatory potential – toothache.[255] It also tells us that Pliny believed that baby swallows could not see until their mother had brought them a piece of this herb. It could also be used as an ointment for the eye, for jaundice, and to remove black spots from the body by means of a plaster. In this text it is used in combination with honey and a brass pan, in a similar application to the Bald's Leechbook eye salve,[256], wine and vinegar ('aisell').[257] Greater Celandine is anti-inflammatory, analgesic, anti-nociceptive, anti-proliferative, pro-apoptic, cytotoxic, and anti-tumour. Greater Celandine's analgesic effect is comparable to morphine, both berberine and chelidonine found in the plant are analgesic. It also contains Sanguinarine, an anti-inflammatory. The plant works through a number of anti-inflammatory and pain-killing mechanisms including disrupting the NFkB pathway and TNF-a, and reducing interleukin 6 which can cause chronic inflammation when dysregulated.[258] Berberine as previously mentioned, is anti-inflammatory and works by blocking COX2 to reduce inflammation. PGE2 (a prostaglandin) also plays a role in oral cancer, by interfering with interleukins IL1B and IL6, as well as TNF-a. Greater Celandine has significant anti-inflammatory action, and thus anti-cancer properties as well. This plant is also antioxidant acting against NO and iNOS reducing works against oxidative stress. Another more unexpected medicinal property of Greater Celandine is that the chemical Chelidonine found within it may reduce multi-drug resistance through the inhibition of IL-8

[254]Moreno Ollala (ed.), *Lelamour Herbal*. Pp128, 257-7: Appendix:16A-L.
[255]Other uses include Removal of worms from the teeth and mouth, and removing black spots from the body: See: *Ibid.* Pp128.
[256]Harrison, Roberts, Gabrilska, Rumbaugh, Lee, Diggle, 'A 1000-year-old Antimicrobial Remedy with Antistaphylococcal Activity.' Pp1-7: And: Furner-Pardoe, Anonye, Cain, Moat, Ortori, Lee, Barrett, Corre, Harrison, 'Anti-biofilm efficacy of a medieval treatment for bacterial infection requires the combination of multiple ingredients' Pp1-14.
[257]Moreno Ollala (ed.), *Lelamour Herbal*. Pp128, 257-7: Appendix:16A-L.
[258]T.Tanaka T, M. Narazaki,, T. Kishimoto.. 2014. 'IL-6 in Inflammation, Immunity, and Disease.' *Cold Spring Harbor Perspectives in Biology*. Vol. 6. No. 10. October. Pp1-16

(interleukin that activates white blood cells in inflamed areas[259]), and the production of I-TAC, an inflammatory cytokine.[260]

Olalla's second option for this entry *Ranunculus ficaria* L. unfortunately appears to have very little research available. The small amount of information found suggests that it may be toxic, although possibly anti-inflammatory.[261] However, more research would need to be sourced on this plant in order to enable further discussion.[262] Annotations for this particular entry are by hand E who has enumerated this entry as 25. This entry has been annotated by the surgeon Richard Dod who has added a 'nota' to the margin of line 332 which discusses worms in the teeth. No temperament has been provided for this entry. The source Olalla provides as *De viribus herbarum*, and once again there is no obvious Arabic or eastern influence.[263]

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[259]M. Bickel. 1994. 'The role of interleukin-8 in inflammation and mechanisms of regulation.' *Journal of Periodontology.* Vol. 64. No. 5. May. Pp456-60.

[260] P. Ł. Mikołakczak, B. Kędzia, M. Ożarowski, R. Kujawskia, A. Bogacz, J. Bartkowiak-Wieczorek, W. Białas, A. Gryszczyńska, W. Buchwald, M. Szulc, N. Wasiak, M. Górska-Paukszta, J. Baraniak, B. Czerny, A. Seremak-Mrozikiewicz. 2015. 'Evaluation of Anti-inflammatory and analgesic activities of extracts from herb of Chelodonium majus L.' *Central European Journal of Immunology.* Vol. 40. No. 4. Pp400-410: See also: M. Gilca, L. Gaman, E. Panait, I. Stoian, V. Atanasiu. 2010. 'Chelidonium majus - - an integrative review: traditional knowledge versus modern findings.' *Forschende Komplmentarmedizin.* Vol. 17. No. 5. October. Pp241-8: And: S. Zielińska, A. Jezierska-Domaradazka, M. Wójciak-Kosior, I. Sowa, A. Junka, A. M. Matkowski. 2018. 'Greater Celandine's Ups and Downs – 21 Centuries of Medicinal Uses of *Chelidonium majus* From the Viewpoint of Today's Pharmacology.' *Frontiers in Pharmacology*. Vol. 9. Pp1-29: and: Y-C. Lee, S-H. Kim, S-S. Roh, H-Y. Choi, Y-B. Seo. 2007. 'Suppressive effects of Chelidonium majus methanol extract in knee joint, regional lymph nodes, and spleen on collagen-induced arthritis in mice.' *Journal of Ethnopharmacology*. Vol. 112. No. 1. May. Pp40-8: And: X-Y. Huang, Z-X. Shao, L-J. An, J-J. Xue, D-H. Li. Z-L. Li, H-M. Hua. 2019. 'New lignanamides and alkaloids from *Chelidonium majus* and their anti-inflammation activity.' *Fitoterapia*. Vol. 139. November. Pp1-6: and: B. Li, W. Xu, L. Xu, Z. Jiang, Z. Wen, K. Li, S. Xiong. 2010. 'I-TAC is a dominant chemokine in controlling skin intragraft inflammation via recruiting CXCR3+ cells into the graft.' *Cell Immunology*. Vo. 260. No. 2. Pp83-91.

[261]Mikołakczak, Kędzia, Ożarowski, Kujawskia, Bogacz, Bartkowiak-Wieczorek, Białas, Gryszczyńska Buchwald, Szulc, Wasiak, Górska-Paukszta, Baraniak, Czerny, Seremak-Mrozikiewicz, 'Evaluation of Anti-inflammatory and analgesic activities of extracts from herb of Chelodonium majus L.' Pp400-410.

[262]Plants for A Future.org. 2021. *Ranunculus ficaria – L.* Available from: https://pfaf.org/USER/Plant.aspx?LatinName=Ranunculus+ficaria [Accessed: 23/9/21]: and: T. S. C. Li. 2002. *Chinese and Related North American Herbs: Phytopharmacology and Therapeutic Values.* CRC press, Boca Raton. P277. Available from: https://chempedia.info/page/100128124000142251050254139123163082132073010238/ [Accessed: 23/9/21]

[263]Moreno Ollala (ed.), *Lelamour Herbal.* P128, 256-7.

Remedy 13: Centory

This next entry is relatively short and deals with Centaury, and Olalla indicated it is more likely to be Minor Centaury (*Centuarium erythraea* Rafn.). Centaury is listed as a wound-healing herb, for aching sinews, as an emmenagogue or abortive, and for use against venom, and is used in combination with wine or water.[264] It has been found to be anti-inflammatory, antioxidant, cytotoxic, and anti-proliferative. The plant has been found to contain terpenoids, flavonoids, phenolic acids, quercetin, kaempferol, isorhamnetin and glycosides. It aids inflammation reduction by inhibiting Lox and reducing NO. As an antioxidant it scavenges free radicals and superoxide anions. The plant's cytotoxic and anti-proliferative properties also mean that it has benefits against cancer, helping to prevent cancerous cell and tumour growth. [265] This entry is numbered 26 by Hand E. Hand C compares the plant to 'erthegall', having a yellow flower, and suggest that used with white wine Centaury aids any disease. The entry's temperament is incomplete, given as dry, only. This entry again follows theme of most of the entries having been based upon *De viribus herbarum*, with no obvious arabic influence.[266]

[264]Moreno Ollala (ed.) *Lelamour Herbal*. Pp129, 257-8: Appendix: 17A-L.

[265]T. Berkan, L. Ustünes, F. Lermioglu, A. Ozer. 1991. 'Antiinflammatory, analgesic, and antipyretic effects of an aqueous extract of Erythraea centaurium.' *Planta Medica.* Vol. 57. No. 1. Pp34-7: See also: N. E. Menyiy, F-E. Guaouguaou, A. E. Baaboua, N. E. Omari, D. Taha, N. Salhi, M. A. Shariati, T. Aanniz, T. Benali, G. Zengin, M. El-Shazly, I. Chamkh, A. Bouyahya. 2021. 'Phytochemical properties, biological activities and medicinal uses of Centaurium erythraea Rafn.' *Journal of Ethnoparmacology*. Vol. 10. August. Pp1-28: and: ChEBI. 2018. *CHEBI: 145817 – neophytadiene.* Available from: https://www.ebi.ac.uk/chebi/searchId.do;jsessionid=255B012E6EF9CD71A48A4065B9B4A089?chebiId=CHEBI:145817 [Accessed: 23/9/21]: and: M. R. Kachmar, A. P. Oliviera, P. Valentão, A. Gil-Izquierdo, R. Domí nguez-Perles, A. Ouahbi, K. E. Badaoui, P. B. Andrade, F. Ferreres. 2019. 'HPLC-DAD-ESI/MS^n phenolic profile and *in vitro* biological potential of *Centaurium erythraea* Rafn aqueous extract.' *Food Chemistry*. Vol. 278. April. Pp424-433.

[266]Moreno Ollala (ed.), *Lelamour Herbal*. Pp129, 257-8: Appendix: 17A-L.

Remedy 14: Coryandyr/Coriandrum

Coriander (*Coriandrum sativum L*.) is an herb that will be familiar to many readers. In the *Lelamour Herbal* it is used against womb (intestinal) worms, swelling (genital), to reduce menstrual flow, bleeding, aching and against recurring fever. Olalla identifies 'cotidiane' (daily recurring fever) as a copy mistake for tercian fever (recurring every 3 days). This entry mentions a number of extra ingredients, rosin, vinegar, honey, water, and white breadcrumbs. However, Olalla notes that vinegar ('aysell') may be a scribal error, as in *De viribus herbarum* it was used with coriander to remove worms in the previous sentence of the entry. The second mention of fever is also an error and should read 'accesse' (sudden attack of illness).[267] The temperament for this plant is given as cold only, and Olalla suggests that this particular plant's temperament was somewhat debated. Dioscorides believed it to be it to be cold, but Galen believed the plant to be cold and dry whilst its juice was hot and moist, and Paul of Aegina, Fuchs and Turner were also all unclear on the correct temperament for the species. Dodoens settled on contrasting complexions for plant and seed. The remedy appears to have no annotations of note.[268]

Coriander has been considerably researched as a potential medicinal plant. It has been shown to be anti-inflammatory, anti-microbial, antifungal, antioxidant, anti-diabetic (Anti-lipidemic and anti-hyperglycemic), anti-convulsant, antidepressant, anxiolytic, sedative and anti-cancer. The herb acts as an anti-inflammatory on various levels; MAPK, NF-kB (suppression of macrophages) iNOS, COX-2, NO, PGE2, Interleukins (e.g. IL-6), and TNF-R1.[269] Sahib et al. suggest that the leaves have

[267]Moreno Ollala (ed.), *Lelamour Herbal*. Pp129-30, 260-2: Appendix:18A-L
[268]*Ibid.* Pp129-30, 260-2.
[269]N. G. Sahib, F. Anwar, A-H. Gilani, A. A. Hamid, N. Saari, K. M. Alkharfy. 2013. 'Coriander (Coriandrum sativum L.): A potential Source of High-Value Components for Functional Foods and Nutraceuticals – A Review.' Phytotherapy Research, Vol. 27. No. 10. October. Pp1439-1456: See also: V. Prachayasittikul, S. Prachayasittikul, S. Ruchirawat, V. Prachaysittikul. 2018. 'Coriander (Coriandrum sativum): A promising functional food towards well-being.' *Food Research International*. Vol. 105. March. Pp305-323: and: B. Heidari, S. E. Sajjadi, M. Minaiyan. 2016. 'Effect of *Coriandrum sativum* hydroalcoholic extract and it's essential oil on acetic acid-induced colitis in rats.' *Avicenna Journal of Phytomedicine*. Vol. 6. No. 2. March-April. Pp205-214: and: H. Mechchate, I. Es-safi, A. Amaghnouje, S. Boukhira, A. A. Alotaibi, M. Al-zharani, F. A. Nasr, O. M. Noman, R. Conte, E. H. E. Y. Amal, H. Bekkari, D. Bousta.2021. 'Antioxidant, Anti-inflammatory and Antidiabetic

more antioxidant power than the seeds. The plant contains flavonoids, quercetin, and kaempherol, which also makes it hepatoprotective; coriander can restore liver and kidney structure after damage.[270] As previously discussed with remedies 2 and 11, some plants' anti-inflammatory properties could also help to control diabetes. Coriander is anti-hyperglycemic and encourages the body to metabolise glucose. This particular study also notes that there is a need for safer anti-inflammatory drugs due to side effects (and in some cases fatal toxicity) and discusses both the Arabian and Sri Lankan tradition of using coriander in medicine.[271] Tests of the herb on rheumatoid arthritis, which is caused by inflammation, showed no adverse effects on administering the herb.[272] For similar reasons coriander may also be valuable in helping to treat inflammatory bowel disease; the reduction of inflammation and oxidants allows ulcers caused by the disease to heal, much like the glucocorticoids usually used in treatment.[273]. The ascorbic acid found in the plant is antioxidant and anti-cancer, killing cells by increasing SOD (superoxide dismutase), which creates more cancer cell killing H_20_2. This mechanism has the potential to encourage cancer, however this effect is reduced via antioxidants.[274] Linalool is another prominent chemical found in coriander, which is anti-inflammatory, neuroprotective and also anti-cancer. Its anti-inflammatory and neuroprotective qualities mean that it could be used in the treatment of Alzheimer's, which is thought to be caused by oxidative stress damage, and also to help prevent convulsions and possibly migraines. Treatment

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Properties of LC-MS/MS Identified Polyphenols from Coriander Seeds.' *Molecules*. Vol. 26. No. 2. January. Pp1-13: and: H. Huang, T. Nakamura, T. Yasuzawa, S. Ueshima. 2020. 'Effects of Coriandrum sativum on Migration and Invasion Abilities of Cancer Cells.' *Journal of Nutritional Science and Vitaminology (Tokyo)*. Vol. 66. No. 5. Pp468-477: and: B. Laribi, K. Kouki, M. M'Hamdi, T. Bettaieb. 2015. 'Coriander (Coriandrum sativum L.) and it's bioactive constituents.' *Fitoterapia*. Vol. 103. June. Pp9-26. Available from: https://pubmed.ncbi.nlm.nih.gov/25776008/ [Accessed: 15/8/21].

[270]Sahib, Anwar, Gilani, Hamid, Saari, Alkharfy, 'Coriander (Coriandrum sativum L.): A potential Source of High-Value Components for Functional Foods and Nutraceuticals – A Review.' Pp1439-1456

[271]Mechchate, Es-Safi, Amaghnouje, Boukhira, Alotaibi, Al-zharani, Masr, Noman, Conte, Amal, Bekkari, Bousta, 'Antioxidant, Anti-inflammatory and Antidiabetic Properties of LC-MS/MS Identified Polyphenols from Coriander Seeds.'Pp1-13.

[272]Sahib, Anwar, Gilani, Hamid, Saari, Alkharfy, 'Coriander (Coriandrum sativum L.): A potential Source of High-Value Components for Functional Foods and Nutraceuticals – A Review.' Pp1439-1456.

[273]Heidari, Saijadi, Miniayan, 'Effect of *Coriandrum sativum* hydroalcoholic extract and it's essential oil on acetic acid-induced colitis in rats.'Pp205-214

[274]Huang, Nakamura, Yasuzawa, Ueshima, 'Effects of Coriandrum sativum on Migration and Invasion Abilities of Cancer Cells.' Pp468-477.

of migraine and chronic pain conditions would be further aided by the plant's analgesic properties, inhibiting central pain receptors,[275] which work on reducing nociception, like opioids do.[276] Given its myriad of properties, if drug interactions can be solved coriander could be used alongside antibiotics in order to aid recovery for a wide variety of illnesses and ailments.[277]

The source for this particular entry is the *De viribus herbarum*. The properties of anti-diarrhetic, febrifuge and anti-emmenagogue are missing in Dioscoridean account. No actual reference as anthelminic by Galen in *De viribus herbarum*, the galenic reference is actually in regard to temperament.[278] Eastern influences here are possible: Prachayasittikul et al. and Laribi et al., for example discuss the traditional and historic usage of the herb.[279] Thus, here we could argue that it is possible, given the correlation above, that there is some possible influence on the *Lelamour Herbal* from the East given modern research and historical usage appear to match. [280]

[275]Laribi, Louki, M'Hamdi, Bettaieb, 'Coriander (Coriandrum sativum L.) and it's bioactive constituents.' Pp9-26.
[276]Prachayasittikul, Prachayasittikul, Ruchirawat, Prachayasittikul, 'Coriander (Coriandrum sativum): A promising functional food towards well-being.' Pp305-323
[277]Sahib, Anwar, Gilani, Hamid, Saari, Alkharfy, 'Coriander (Coriandrum sativum L.): A potential Source of High-Value Components for Functional Foods and Nutraceuticals – A Review.' Pp1439-1456: See also: Prachayasittikul, Prachayasittikul, Ruchirawat, Prachayasittikul, 'Coriander (Coriandrum sativum): A promising functional food towards well-being.' Pp305-323: and: Heidari, Saijadi, Miniayan, 'Effect of *Coriandrum sativum* hydroalcoholic extract and it's essential oil on acetic acid-induced colitis in rats.'. Pp205-214: and Mechchate, Es-Safi, Amaghnouje, Boukhira, Alotaibi, Al-zharani, Masr, Noman, Conte, Amal, Bekkari, Bousta, 'Antioxidant, Anti-inflammatory and Antidiabetic Properties of LC-MS/MS Identified Polyphenols from Coriander Seeds.'Pp1-13: and: Huang, Nakamura, Yasuzawa, Ueshima, 'Effects of Coriandrum sativum on Migration and Invasion Abilities of Cancer Cells.' Pp468-477:and: Laribi, Louki, M'Hamdi, Bettaieb, 'Coriander (Coriandrum sativum L.) and it's bioactive constituents.' Pp9-26.
[278]Moreno Ollala(ed.), *Lelamour Herbal*. Pp129-30, 260-2.
[279]Prachayasittikul, Prachayasittikul, Ruchirawat, Prachayasittikul, 'Coriander (Coriandrum sativum): A promising functional food towards well-being.' Pp305-323: and Laribi, Louki, M'Hamdi, Bettaieb, 'Coriander (Coriandrum sativum L.) and it's bioactive constituents.' Pp9-26.
[280]Heidari, Saijadi, Miniayan, 'Effect of *Coriandrum sativum* hydroalcoholic extract and it's essential oil on acetic acid-induced colitis in rats Pp205-214: and Mechchate, Es-Safi, Amaghnouje, Boukhira, Alotaibi, Al-zharani, Masr, Noman, Conte, Amal, Bekkari, Bousta, 'Antioxidant, Anti-inflammatory and Antidiabetic Properties of LC-MS/MS Identified Polyphenols from Coriander Seeds.'Pp1-13.

Remedy 15: Carwey/Caruium

Caraway (*Carum carvi* L.) is the plant identified by Olalla for this entry. Its uses include removing wind from the bowels and womb, reducing cough, frenzy, bites, scabies, menstruation, 'flaunke' swelling (side of the abdomen), aids digestion, kills worms in the bowels, casting caused by phlegm, sore womb, moistens the stomach, urination, and itching.[281] The only ingredients beside Caraway mentioned are stale ale and vinegar. Frenzy or 'frensey' is discussed by Olalla; it is described as a mental instability caused by an abscess or infected swelling of the brain. It was believed to be caused by burnt bile (causing irritability) or boiling blood fumes (causing insanity and insomnia). As Olalla points out, given that this disease is related to heat, and was thought to be more common in the summer the use of a hot, dry herb here does indeed seem counter-productive, given that in medieval medicine something that created a cooling effect would have been used against a hot malady. 'Scabbis' suggests scabies as another disease being dealt with here. In the modern mind scabies is caused by mites laying eggs in the skin, causing intense itching and a raised or red rash. However, Olalla discusses that 'scab' was used as a catch-all term for skin conditions presenting through itching, and that they were believed to be caused by an excess of blood or salty humours in the body.[282] There were also two types distinguished; one causing dry, scaly skin and the other with pustules or small blisters. The modern comparison that Olalla gives is eczema, which can appear as dry scaly skin or with small blisters depending on the type. It could also be dermatitis, which can present in similar way and is generally classed as a form of eczema. [283] As with the entry above, there are no annotations of note for this entry. [284]

[281]Moreno Ollala (ed.), *Lelamour Herbal.* Pp P131-2, 267-9: Appendix: 20-A-L.
[282]*Ibid.* Pp P131-2, 267-9: See also: NHS. 2020. *Scabies.* Available from: https://www.nhs.uk/conditions/scabies/ [Accessed: 23/9/21].
[283]*Ibid.* Pp131-2, 267-269: See also: Medical News Today. 2021. *What to know about eczema*. Available from: https://www.medicalnewstoday.com/articles/14417#_noHeaderPrefixedContent [Accessed: 23/9/21]: and: NHS. 2019. *Contact Dermatitis*. Available from: https://www.nhs.uk/conditions/contact-dermatitis/ [Accessed: 23/9/21]: and: Oakley. 2014. *Vesicular Hand Dermatitis*. Available from: https://dermnetnz.org/topics/vesicular-hand-dermatitis [Accessed: 23/9/21]
[284]Moreno Ollala (ed.), *Lelamour Herbal*. Pp P131-2, 267-9: Appendix: 20-A-L.

Caraway has been researched in relation to several properties including anti-inflammatory, spasmolytic, antimicrobial, antioxidant, carminative, anti-diabetic, and immunomodulation. Caraway aids in anti-inflammation (acting on IFN -Y, IL-6 and TNF- alpha) by reducing cytokines in a similar way to glucocorticoids, used to treat IBD (Irritable Bowel Disease; see also remedy 14).[285] This means that it could be used to replace or aid current treatments and preventions and reduce side effects. The herb is also anti-colitis, due to its ability to reduce prostaglandin E2. Linalool is a component found in this herb, which has various beneficial properties as discussed in remedy 14. Carvone appears to be the main anti-inflammatory constituent in this case.[286] The remedy refers to scabies or some kind of eczema-like condition.[287] Coriander has been used to help treat scabies due to its anti-inflammatory properties in essential oil form, which is believed to be safe topically. As in many of the above remedies the antioxidant property is again evident here and provides protection against nephrotoxicity due to this. There is also testing for use, with promising result, on diabetes due to antioxidant reduction of oxidative stress.[288] Another repeating theme here is the use of an anti-inflammatory and antioxidant herbs in the control of tumour size and proliferation. However, more research is needed on how the mechanisms of these processes work and side effects of the herb. Coriander reduces gall bladder emptying in healthy individuals and can cause kidney inflammation – overdoses have also been reported. [289]

The herb has also been reported in testing for use against dyspepsia, due to anti-inflammatory, gastroprotective, spasmolytic and prokinetic properties, which can be enhanced by

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[285]M. Mahboubi. 2019. 'Caraway as Important Medicinal Plants in Management of Diseases.' *Natural Products and Bioprospecting*. Vol. 9. No. 1. February. Pp1-11.

[286]A. Keshavarz, M. Minaiyan, A. Ghannadi, P. Mahzouni. 2013.'Effects of Carum Carvi L. (Caraway) extract and essential oil on TNBS-induced colitis in rats.' Research in Pharmaceutical Sciences, Vol. 8. No. 1. Jan-March. Pp1-8.

[287]Moreno Ollala (ed.), *Lelamour Herbal*. Pp P131-2, 267-9: Appendix: 20-A-L.

[288]M. Eddouks, A. Lemhadri, J-B. Michel. 2004. 'Caraway and Caper: potential anti-hyperglycaemic plants in diabetic rats. *Journal of Ethnopharmacology.* Vol. 94. No. 1. September. Pp143-148.

[289]Keshavarz, Minaiyan, Ghannadi, Mahzouni, 'Effects of Carum Carvi L. (Caraway) extract and essential oil on TNBS-induced colitis in rats.' Pp1-8. And: Mahboubi, 'Caraway as Important Medicinal Plants in Management of Diseases.' Pp1-11.

combination with peppermint essential oil. These properties are valuable because they inhibit gastric ulcers, allowing them to heal, and also aid colitis for the same reasons.[290] Another study has researched caraway and found that in combination with coriander (a weaker antioxidant), its properties make it a good target for anti-diabetics and anti-Alzheimer's testing.[291] Again, the antioxidant effect, which helps to reduce inflammation has also been found to be beneficial in treating sepsis and septic shock. Sepsis creates a substantial immune and therefore inflammatory response; antioxidants are reduced, and excess production of free radicals creates oxidative stress. Added to this, infection causes macrophages and monocytes to make cytokines like IL 1 and TNF-a. This means that a significant amount of antioxidant activity is needed to disrupt ROS and bring inflammation and oxidative stress into line. However, polyphenols in the plant can be turned into pro-oxidants under certain conditions, meaning that the hydroalcoholic extract of the plant was not effective. Therefore, the herb extract needs to be administered orally, intravenously or subcutaneously.[292]

This entry does not originate from any one identifiable source and Olalla believes it to be based upon a number of sources, due to repetition of using it against wind and worms. This may be why there is a hot, dry herb being used on illnesses that it could worsen, like frenzy, and why it is being described as being able to moisten the stomach despite being a dry herb. A mix of contrasting sources may answer why the entry appears confused.[293]

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[290]Mahboubi, 'Caraway as Important Medicinal Plants in Management of Diseases.' Pp1-11: Keshavarz, Minaiyan, Ghannadi, Mahzouni, 'Effects of Carum Carvi L. (Caraway) extract and essential oil on TNBS-induced colitis in rats.' Pp1-8: and: J. Li, L. Lv, J. Zhang, L. Xu, E. Zeng, Z. Zhang, F. Wang, X. Tang. 2019. 'A Combination of Peppermint Oil and Caraway Oil for the Treatment of Functional Dyspepsia: A Systematic Review and Meta-Analysis.' *Evidence-Based Complementary and Alternative Medicine.* Vol. 2019. Pp1-8.

[291]H. Hajlaoui, S. Arraouadi, E. Noumi, K. Aouadi, M. Adnan, M. A. Khan, A. Kadri, M. Snoussi. 2021. 'Antimicrobial, Antioxidant, Anti-Acetylcholinesterase, Antidiabetic, and Pharmacokinetic Properties of *Carum carvi* L. and *Coriandrum sativum* L. Essential Oils Alone and in Combination. *Molecules*. Vol. 26. Pp1-18.

[292]Mahboubi, 'Caraway as Important Medicinal Plants in Management of Diseases.' Pp1-11: and: A. Dadkhah, F. Fatemi. 2011. 'Heart and kidney oxidative stress status in septic rats treated with caraway extracts.' *Pharmaceutical Biology*. Vol. 49. No. 7. Pp679-686.

[293]Moreno Ollala (ed.), *Lelamour Herbal.* Pp P131-2, 267-9: Appendix: 20-A-L.

There is potential argument for some eastern influence again here. In traditional Persia medicine the herb is used to relieve flatulence and remove humours from the stomach. This matches the description of usage in the remedy in removal of wind from the bowels and womb.[294]

Remedy 16: Herba Petri/Cowslope

Olalla has tentatively identified this entry as Oxlip (*Primula elatior* L.). The herb is used for a swollen stomach, as a digestion aid, for 'all sekenes that is wiþ-in the body', for urination, menstruation, venomous bites, but it is noted that it should not be used for a 'shelowe' (emaciated) individual. The roots and seeds are described as the most useful part of the plant. There is only one other ingredient listed in the entry, which is wine, but using the herb or adding it into electuaries for digestion is mentioned. The plant is described as being hot and dry in the third degree, and the only annotation of the entry is numbering by hand E.[295]

Primula elatior has been researched by modern scientists, although less so than *Primula veris* L. (Cowslip). Primula species overall are secretolytic, expectorant, anti-inflammatory, diuretic, anti-microbial, antifungal, and sedative. In contrast to the remedy, traditional usage includes treatment of coughs, bronchitis, catarrh, nervousness, headache and rheumatism. Despite this disparity, *P. elatior* does appear to be anti-inflammatory, and antioxidant. It contains flavonoids such as rutoside (more so than *P. veris*), kaempferol, isorhamnetin and hyperoside. Rutoside is a strong antioxidant, and also antimicrobial and anti-inflammatory. A form of isorhamnetin – isorhamnetin aglycon is

[294]*Ibid.* Pp P131-2, 267-9: And: Mahboubi, 'Caraway as Important Medicinal Plants in Management of Diseases.' Pp1-11: and Dadkhah, Fatemi, 'Heart and kidney oxidative stress status in septic rats treated with caraway extracts.' Pp679-686 Hajlaoui, Arraouadi, Noumi, Aouadi, Adnan, Khan, Kadri, Snoussi, 'Antimicrobial, Antioxidant, Anti-Acetylcholinesterase, Antidiabetic, and Pharmacokinetic Properties of *Carum carvi* L. and *Coriandrum sativum* L. Essential Oils Alone and in Combination.'. Pp1-18: and: Keshavarz, Minaiyan, Ghannadi, Mahzouni, 'Effects of Carum Carvi L. (Caraway) extract and essential oil on TNBS-induced colitis in rats.' Pp1-8: And: Mahboubi, 'Caraway as Important Medicinal Plants in Management of Diseases.' Pp1-11.
[295]Moreno Ollala (ed.), *Lelamour Herbal*. Pp135, 276-8, 489.

cytotoxic to cancerous liver cells, thus there is also potential here for cancer treatment.[296] The antioxidant and anti-inflammatory effect of the herb has been found to be stronger than aspirin at a 100mg/kg dosage. Furthermore, the presence of terpenes and flavonoids in combination inhibit prostaglandin synthesis which means inflammation is being tackled in multiple ways in one plant. [297]

Coumarins have also been found in Oxlip; despite being a hepatotoxin in high doses, it also shows antioxidant or anti-inflammatory potential. It has been used to treat oedema and has been studied for effects on colitis. As discussed in previously (see Remedy 15), antioxidant effects also show potential for the chemical as a target for IBD. Naturally occurring coumarin inhibits COX, LOX, and superoxide anion generation. An extract of *Artemisia capillaris* Thunberg (from Traditional Chinese Medicine) for skin inflammation evidenced inhibition on LOX. The esculin form of coumarin reduces TNF-a and IL-6. It also inhibits activation of MAPK. Other coumarin types have been found to be effective for arthritis and neuroprotective – IL-1B and TNF-a reduced and iNOS and COX-2 are inhibited. Overall, large numbers of naturally occurring coumarins are anti-inflammatory.[298]

A trial of *P. elatior* has also taken place in combination with other plants. A combined extract of gentian root, primula flower, sorrel, elder flower and verbena herb extracts, known as BNO1016, have been used to combat inflammation from rhinosinusitis. The mechanisms of the combination

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[296]K. Bączek, J. L. Pryzbył, M. Mirgos, O. Kosakowska, I. Szymborska-Sandhu, Z. Węglarz. 2017. 'Phenolics in Primula veris L. and P. elatior (L.) Hill Raw Materials.' International Journal of Analytical Chemistry. Vol. 2017. Pp1-7.

[297]D. S. Antal. 2010. 'Medicinal Plants With Antioxidant Properties From Banat Region (Romania): A Rich Pool For The Discovery Of Multi-Target Phytochemicals Active In Free-Radical Related Disorders.' *Analele Universităţii din Oradea – Fascicula Biologie.* Tom. XVII. No. 1. Pp14-22: And: F. A. Mostafa, M. A. Gamal, I. R. M. Sabrin, E. S. Ehab. 2014. 'Antioxidant and Anti-Inflamatory Activities of Phenolic Constituents from *Primula elatior L.* Aerial Part.' *International Journal of Pharmacognosy and Phytochemical Research*. Vol. 6. No. 1. Pp74-78.

[298]G. Kirsh, A. B. Abdelwahab, P. Chaimbault. 2016. 'Natural and Synthetic Coumarins with Effects on Inflammation.' *Molecules*. Vol. 21. No. 10. October. Pp1-13. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6273422/ [Accessed: 8/8/21]: See also: R. Vázquez-Fresno, A. R. R. Rosana, T. Sajed, T. Onookme-Okome, N. A. Wishart, D. S. Wishart. 2019. 'Herbs and Spices – Biomarkers of Intake Based on Human Intervention Studies – A Systematic Review.' *Genes & Nutrition*. Vol. 14. Pp1-27.

are not wholly understood, but it inhibits COX-2 and PGE2. It also disrupts the 'leukotriene link', where leukotrienes (early players in the inflammatory process) trigger the production of other mediators (such as cytokines). By disrupting this, it stops inflammation progressing. This extract has been found to be more effective than ibuprofen in certain dosages and is recommended for pre-clinical trialing.[299] Interestingly, this extract contains both *P. veris* and *P. elatior*, which have different constituent make ups, but similar bioactivity.[300] This combination creates an effective drug and echoes the Bald's Leechbook studies.[301]

These properties do not necessarily fit with all the uses of the remedy. However, if the usage for swollen stomach is assumed to be inflammatory swelling, then it may be beneficial. Anti-inflammatories may also aid in treating bites, as the remedy discusses. Inflammation is believed to be a player in many diseases, so using *Primula* for 'all sekenes that is wiþ-in the body' could well be beneficial, and accurate. In terms of menstruation, anti-inflammatories could help with menstrual pain, and possibly with heavy bleeding by interfering with prostaglandins. [302]

The source for this entry is *De viribus herbarum*, and the herb appears in a later entry. The final line of the entry has been identified by Olalla as a poor copying of the *De viribus herbarum* entry, and the use of 'shelowe' (which may mean thin or emaciated) may also be a misreading of 'oculis Strabus' meaning squinting eye by the scribe. There does not appear to be any Arabic influence in the entry.[303]

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[299]I. A. Zupanets, S. K. Shebeko, V. I. Popovych, S. M. Zimin. 2020. 'Study of the anti-inflammatory effect of the combined extract BNO 1016 in a leukotriene-dependent in vivo inflammation model.'*Clinical Phytoscience*. Vol. 6. No. 7. Pp1-8.

[300]Bączek, Pryzbył, Mirgos, Kosakowska, Szymborska-Sandhu, Węglarz, 'Phenolics in Primula veris L. and P. elatior (L.) Hill Raw Materials.'Pp1-7.

[301]Furner-Pardoe, Anonye, Cain, Moat, Ortori, Lee, Barrett, Corre, Harrison, 'Anti-biofilm efficacy of a medieval treatment for bacterial infection requires the combination of multiple ingredients' Pp1-14. See also: Harrison, Roberts, Gabrilska, Rumbaugh, Lee, Diggle, 'A 1000-year-old Antimicrobial Remedy with Antistaphylococcal Activity.' Pp1-7.

[302]Moreno Ollala (ed.), *Lelamour Herbal*. Pp135, 276-8, 489: And: NHS. 2018. *Treatment: Heavy Periods*. Available from: https://www.nhs.uk/conditions/heavy-periods/treatment/ [Accessed: 23/9/21]

[303]Moreno Ollala (ed.), *Lelamour Herbal*. Pp135, 276-8, 489.

Remedy 17: Persicaria/Culrage

This is one of the shorter entries of the herbal, and two species are discussed and identified here; Waterpepper; *Hydropiper* L. Delarbre, and Willow-weed: *Persicaria maculosa* Gray. The herb is identified only for its use in combatting gout. No temperament is provided, and only the single annotation of 'goute' has been made by hand B. Gout can be treated using anti-inflammatories, hence the inclusion of this particular remedy in the overall discussion.[304]

Waterpepper (*Hydropiper* L. Delarbre) has been discovered as an anti-inflammatory, antioxidant, antinociceptive (central and peripheral), anti-hyperglycemic, anti-hypertensive, antioxidant and anti-ageing, sedative and anxiolytic as well as anti-obesity. It contains many constituents that have been previously discussed including quercetin, isorhamnetin, cyanidin, kaempferol, apigenin, epicatecin, gallic and ellagic acids and terpenoids. Its anti-inflammatory properties mean that it could be a possible target for Alzheimer's treatment. Persicarin found in the plant is neuroprotective and acts on NO, and SOD alongside glutathione reductase and glutathione peroxidase. The plant appears to have a low level of toxicity but use on the eyes can cause irritation or temporary blindness, as well as a small risk of mutagenicity. As with many of the plants above, the exact ways the plant works still need more research.[305]

Another study by Huq et al. reinforced the above, with Waterpepper being identified as antibacterial, anti-fungal, antihelminth, antifeedant, cytotoxic, antioxidant, anti-inflammatory, antinociceptive, oestrogenic, antifertility, and neuroprotective. The study identified the constituents

[304]*Ibid.* Pp136, 279: Appendix: 22A-L: And: Johns Hopkins Arthritis Centre. 2021. *Treatment of Gout*. Available from: https://www.hopkinsarthritis.org/arthritis-info/gout/gout-treatment/ [Accessed: 23/9/21]

[305]V. Arya, R. K. Parmar.2020. 'A Perspective on therapeutic potential of weeds.' *Journal of Plant Science and Phytopathology*. Vol. 4. Pp42-54: And: N. Aziman, N. Abdullah, A. Bujang, Z. M. Noor, A. A. Aziz, R. Ahmad. 2021. 'Phytochemicals of ethanolic extract and essential oil of *Persicaria hydropiper* and their potential as antibacterial agents for food packaging polylactic film.' *Journal of Food Safety*. Vol. 41. Pp1-14: and: M. Ayaz, I. Ahmad, A. Sadiq, F. Ullah, M. Ovas, A. T. Khalil, H. P. Devkota. 2020. '*Persicaria hydropiper* (L.) Delarbre: A Review on traditional uses, bioactive chemical constituents and pharmacological and toxicological activities.' Journal of Ethnopharmacology, Vol. 251. April. Pp1-11.

mentioned above alongside types of sesquiterpenes which are known to be antioxidant. The plant protects from free radicals, thus reducing oxidative stress, as well as superoxide anion scavenging. Its anti-inflammatory properties inhibit NO, TNF-a, PGE2, and other pathways. Polygodial (and Polygonolide) extracted from the plant have anti-inflammatory and anti-allergy properties, which also act on multiple pathways.[306] Its antinociceptive properties also have analgesic potential.[307] Waterpepper also has anti-cancer properties; it is anti-proliferative against cervical epithelial adenocarcinoma, and cytotoxicity has been seen in mouse tests, meaning it inhibits cancer cell growth and tumour size.[308]

A further study has identified it as antileukemic.[309] This study also further discusses Waterpepper's neuroprotective qualities; persicarin inhibits intracellular calcium influx, NO production, cellular peroxide formation, and increases SOD, glutathione reductase and glutathione peroxidase.[310] Thus, the traditional usage mentioned (for pain and inflammatory disorders) is justified and does potentially support the use of the herb in Lelamour's application for the treatment gout. If it did not help to heal the gout, then it would at least have eased pain felt by the patient. [311]

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[306]A. K. M. M. Huq, J. A. Jamal, J. Stanslas. 2014. 'Ethnobotanical, Phytochemical, Pharmacological, Toxicological Aspects of *Persicaria hydropiper* (L.) Delarbre.' *Evidence-Based Complementary and Alternative Medicine*. Vol. 2014. Pp1-11: See also: N. Prota, R. Mumm, H. J. Bouwmeester, M. A. Jongsma. 2014. 'Comparison of the chemical composition of three species of smartweed (genus Persicaria) with a focus on drimane sesquiterpenoids.' *Phytochemistry*. Vol. 108. December. Pp129-36: And: Aziman, Abdullah, Bujang, Moor, Aziz, Ahmad, 'Phytochemicals of ethanolic extract and essential oil of *Persicaria hydropiper* and their potential as antibacterial agents for food packaging polylactic film.' Pp1-14.

[307]A. Khatun, M. Z. Imam, M. S. Rana. 2015. 'Antinociceptive effect of methanol extract of leaves of *Persicaria hydropiper* in mice.' *BMC Complementary Medicine and Therapies.* Vol. 15. No. 63. Pp1-8.

[308]Huq, Jamal, Stanslas, 'Ethnobotanical, Phytochemical, Pharmacological, Toxicological Aspect of *Persicaria hydropiper* (L.) Delabre.' Pp1-11.

[309]Khatun, Imam, Rana, 'Antinociceptive effect of methanol extract of leaves of *Persicaria hydropiper* in mice.' Pp1-8.

[310]Ibid.Pp1-8: And: Huq, Jamal, Stanslas, 'Ethnobotanical, Phytochemical, Pharmacological, Toxicological Aspect of *Persicaria hydropiper* (L.) Delabre.' Pp1-11.

[311]Moreno Ollala (ed.), *Lelamour Herbal*. Pp136, 279: Appendix: 22A-L: and Khatun, Imam, Rana, 'Antinociceptive effect of methanol extract of leaves of *Persicaria hydropiper* in mice.' Pp1-8: And: Huq, Jamal, Stanslas, 'Ethnobotanical, Phytochemical, Pharmacological, Toxicological Aspect of *Persicaria hydropiper* (L.) Delabre.' Pp1-11.

Persicaria maculosa Gray or Willow-weed is the second plant Olalla has identified for this remedy. Willow-weed has been discovered to be cytotoxic, antibacterial, antifungal, antioxidant, spasmolytic, and insecticidal. The plant contains 10 promising constituents found in study Vasas et al.. These allow it to inhibit PAF receptor binding, interfere with NO synthesis, suppress mRNA expression, and cause cytotoxicity against human neuroblastoma cells (cancer). Again, we also see familiar components such as kaempferol, quercetin, and apigenin creating anti-inflammatory and antioxidant effects. Chemicals called chalcones found in the plant appear to be potential anti-tumour drugs, due to their antioxidant, cytotoxic and apoptosis-inducing effects. This mix of properties means they block and kill cancer cells at multiple levels, disrupting cell cycles, inhibiting angiogenesis, mitochondrial uncoupling, apoptosis, proliferation, metastasis and mitosis (cell division). The derivatives of isorhamnetin and quercetin found in the plant as act as anti-inflammatories and antioxidants but also as insecticide and antifeedant against bugs, meaning that this plant is not only being studied medicinally but also for eco-friendly insect management.[312]

The source for this entry is the *Agnus Castus,* which appears after remedy 18 below in Brodin's work. Brodin's version also discusses the usage of the plant for coughs. The Lelamour entry is missing the physical description of the identified species provided by the text. [313] The temperament is given in the *Agnus castus* as hot and dry. [314]

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[312]A. Vasas, I. Lajter, N. Kúsz, P. Forgó, G. Jakab, C. Fazaka, I. Wilhelm, I. A. Krizbai, J. Hohmann. 2020. 'Flavonoid, stilbene and diarylheptanoid constituents of *Persicaria maculosa* Gray and cytotoxic activity of the isolated compounds.' *Fitoterapia.* Vol. 145. September. Pp1-6: See also: Prota, Mumm, Bouwmeester, Jongsma, 'Comparison of the chemical composition of three species of smartweed (genus Persicaria) with a focus on drimane sesquiterpenoids.' Pp129-36: and: L. Quesada-Romero, C. Fernández-Galleguillos, J. Bergmann, M-E. Amorós, F. Jiménez-Aspee, A. González, M. Simirgiotis, C. Rossini. 2020. 'Phenolic Fingerprinting, Antioxidant, and Deterrent Potentials of *Persicaria maculosa* Extracts.' *Molecules*. Vol. 25. No. 13. July. Pp1-18.

[313]Moreno Ollala (ed.), *Lelamour Herbal*. Pp136, 279: Appendix: 22A-L.

[314]Brodin. *Agnus castus: A Middle English herbal reconstructed from various manuscripts: Edited with introduction, notes and glossary by Gosta Brodin.* P196: and: Moreno Ollala (ed.), *Lelamour Herbal*. Pp136, 279: Appendix: 22A-L.

Remedy 18: Daysye/Consolida minor

This entry refers to a plant familiar to most readers, the Daisy (*Bellis perennis* L.) The described uses are to break 'boche' (bubo/swelling/tumour), heal broken bones, aching, swelling, and bruising – hence the name bruisewort. No other plants other than comfrey are mentioned in the entry.[315] Comfrey is known as a wound healing agent, which is also anti-inflammatory and antioxidant.[316] For bruising it is suggested that herb is used to make a potage, along with comfrey and eaten with pork. No temperament is given, and the source for this entry is once again the *Agnus Castus,* which also contains only a brief entry.[317] In Brodin's explanatory notes, he comments on the fact that the three species of *Consolida* (*major, minor* and *media*) all have similar properties, being known predominantly for healing bones. Olalla supports this but notes only *C. major and C. media* as being associated with bone healing.[318]

Daisy has been identified as containing a variety of beneficial substances; triterpenes, anthocyanins, and flavonoids. Medical properties of the plant include antimicrobial (limited anti-biofilm activity), dermatological, anti-inflammatory, cyto-toxic, antioxidant, hypolipidemic, anti-hemorrhagic, hemolytic, and anti-anxiety. Daisy has been used in homeopathy to treat deep tissue and sports injury, as well as soreness in joints and muscles, which is in line with most of the uses in the entry above.[319] Daisy extract is already used as a component of a drug known as Traumeel, which

[315]Moreno Ollala (ed.), *Lelamour Herbal*. Pp136, 280.
[316]C. Staiger. 2012. 'Comfrey: A Clinical Overview.' *Phytotherapy Research*. Vol. 26. Pp1441-8.
[317]Moreno Ollala (ed.), *Lelamour Herbal* Pp136, 280: And: Brodin. *Agnus castus: A Middle English herbal reconstructed from various manuscripts: Edited with introduction, notes and glossary by Gosta Brodin* Pp148.
[318]*Ibid.* Pp136, 280: And:Brodin. *Agnus castus: A Middle English herbal reconstructed from various manuscripts: Edited with introduction, notes and glossary by Gosta Brodin* P 219.
[319]M. Oberbaum. R. M. Spira. E. Lukasiewicz, Y. Armon, N. Samuels, S. R. Singer, V. Barak, G. Izbicki, S. Einav, M. Hersch. 2011. 'Effect of Traumeel S on Cytokine Profile in Cecal Ligation and Puncture (CLP) Sepsis Model in Rats.' *Journal of Alternative and Complementary Medicine.* Vol. 17. No. 10. Pp909-913: And: A. E. Al-Snafi. 2015. 'The Pharmacological Importance of Bellis Perennis – A Review.' International Journal of Phytotherapy, Vol. 5. No. 2. 63-9: And: V. M. S. de Carvalho, J. L. Covre, R. D. Correia-Silva, I. Lice, M. P. Corrêa, A. M. Leopoldino, C. D. Gil. 2021. '*Bellis perennis* extract mitigates UVA-induced keratinocyte damage: Photoprotective and immunomodulatory effects.' *Journal of Photochemistry and Photobiology B: Biology*. Vol. 221. August. Pp1-8: See also: H. Nasri, M. Bahmani, N. Shahinfard, A. M. Nafchi, S. Saberianpour, M. R. Kopaei.

is effective as an anti-inflammatory treatment for joints, mobility and pain. The plant's anti-cancer and antioxidant properties may also be of relevance given the above remedy's use in breaking 'boche', which could be a reference to a tumour.[320] As with some of the above remedies we see reference to the possibility of use against obesity. The anti-hemorrhagic (stops bleeding) and hemolytic (destroys red blood cells) properties of the plant would account for the usage for bruising, stopping bleeding and helping to break down the blood in the bruise. [321]

Daisy also appears to beneficial for skin inflammation; Saponins in the plant protect against UVB, it reduces ROS, suppresses the inflammatory COX-2, IL-6 and TNF-a. An apigenin derivative, it acts in vitro, as an antioxidant radical scavenger. This means that the plant has immunomodulatory potential for prevention of skin damage due in part to its anti-inflammatory and antioxidant properties.[322]

Another study also notes Daisy's use as an anti-inflammatory and particularly as an antioxidant. We see previously mentioned flavonoids such as quercetin, apigenin, kaempferol and isorhamnetin. The antioxidant property of the plant is believed to protect against important cellular parts such as DNA, which prevents damage, ageing, inflammation, and issues such as atherosclerosis, hypocholesterolemia, ischemic injury (damage caused by blood restriction and lack of oxygen[323]) and cancer. The study also notes that location of the plants sourced made little

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2015. 'Medicinal Plans for the Treatment of Acne Vulgaris: A Review of Recent Evidences.' *Jundishapur Journal of Microbiology*. Vol. 8. No. 11. November. Pp1-9.

[320]Oberbaum, Spira, Lukasiewicz, Armon, Samuels, Singer, Barak, Izbicki, Einav, Hersch, 'Effect of Traumeel S on Cytokine Profile in Cecal Ligation and Puncture (CPL) Sepsis Model in Rats.' Pp909-913.

[321]Al-Snafi. 'The Pharmacological Importance of Bellis Perennis A Review.'. Pp63-9: And: Moreno Ollala (ed.), *Lelamour Herbal*. Pp136, 280:

[322]De Carvalho, Covre, Correia-Silva, Lice, Corrêa, Leopoldino, Gil '*Bellis perennis* extract mitigates UVA-induced keratinocyte damage: Photoprotective and immunomodulatory effects.' Pp1-8: See also: Nasri, Bahmani, Shahinfard, Nafchi, Saberianpour, Kopaei, 'Medicinal Plans for the Treatment of Acne Vulgaris: A Review of Recent Evidences.' Pp1-9.

[323]American Stroke Association. *2021. Ischemic Stroke (Clots).* Available from: https://www.stroke.org/en/about-stroke/types-of-stroke/ischemic-stroke-clots [Accessed: 23/9/21]

difference to the amounts of flavonoids, phenolics or antioxidant activity of the plants, although environmental factors did cause variation. However, the differences were slight enough not to affect overall performance of the plant.[324]

The drug Traumeel, as previously mentioned contains *Bellis perennis* extract. Traumeel is an homeopathic drug, meaning that it contains a highly diluted mixture of extracts. Homeopathic remedies are controversial within the medical community due to conflicting medicinal systems (Homeopathy is holistic as opposed to clinical) and questions arise regarding whether the extreme dilution means remedies do not work effectively.[325] The Traumeel study focused on sepsis, which can be controlled or reduced using anti-inflammatories (reduce cytokines).[326] Previous clinical studies indicate that the drug helps orthopedic conditions, oedema, inflammatory periodontal disease and chemotherapy-induced stomatitis in children having stem cell therapy, suggesting the drug does indeed have some efficacy. However, *in vivo* and *in vitro* studies differ, giving both anti-inflammatory and pro-inflammatory results. *In vitro*, Traumeel is anti-inflammatory, inhibiting IL-1B, TNF-a and IL-8 – in rat studies it also reduced IL-6. *In vivo* IL-1B was higher in the Traumeel group than that of the control group, which would indicate an immunomodulatory (but pro-inflammatory) effect, connected to cytokine immunomodulators. However, this difference in response between *in vivo* and *in vitro* tests may indicate that immunocytes react differently in different contexts. IL-1 is considered pro-inflammatory in critically ill patients, but studies have found that it enhances host resistance and has protective effects on IL-1 antagonists. In rats, treatment with IL-1 and TNF-a reduced mortality. The dual effect of a drug enhancing and inhibiting is known to science and is known as hormesis, where the same drug stimulates at a low doses and inhibits at a higher dose.

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[324]T. Siatka, M. Kašparová. 2010. 'Seasonal Variation in Total Phenolic and Flavonoid Contents and DPPH Scavenging Activity of *Bellis perennis* L. Flowers.' *Molecules*. Vol. 15. No. 12. December. Pp9450-61.
[325]Oberbaum, Spira, Lukasiewicz, Armon, Samuels, Singer, Barak, Izbicki, Einav, Hersch, 'Effect of Traumeel S on Cytokine Profile in Cecal Ligation and Puncture (CPL) Sepsis Model in Rats.' Pp909-913.
[326]*Ibid.* Pp909-913.

Despite this, Traumeel does appear to have an immunomodulatory effect, beneficial in the management of sepsis.[327]

The theme of anti-inflammatory plants being beneficial for diabetes also reappears here, quercetin, kaempferol and apigenin are beneficial alongside rutin, hyperoside and isoquecitrin. [328]There is also a possible Arabic influence for this entry. A. E Al-Snafi, who produced one of the studies on Traumeel is an Arabic author, which may indicate connections between Arabic and medieval western medicine. [329]

Remedy 19: Doworte/Solatrum

This entry has been identified by Olalla as Deadly Nightshade (*Atropa belladonna L*.) The only given usage for this plant is to aid speech, which Olalla suggests is a scribal error for 'slepe'. The two other given names are also identified as errors 'doworte' for dwale and 'dowech' for duscle.[330] Dwale particularly indicates a painkilling use (and thus possibility of anti-inflammatory potential), given that Mount discusses a dwale recipe as an anesthetic in *Medieval Medicine Its Mysteries and Science.* [331] Deadly Nightshade is known as a narcotic, therefore a scribal error of speech for sleep would make sense here. No other ingredients are given in this source, and no temperament is present either.[332]

[327]Oberbaum, Spira, Lukasiewicz, Armon, Samuels, Singer, Barak, Izbicki, Einav, Hersch, 'Effect of Traumeel S on Cytokine Profile in Cecal Ligation and Puncture (CPL) Sepsis Model in Rats.' Pp909-913.
[328]R. Haselgrübler, V. Stadlbauer, F. Stübl, B. Schwarzinger, I. Rudzionyte, M. Himmelsbach, M. Iken, J. Weghuber. 'Insulin Mimetic Properties of Extracts Prepared from *Bellis perennis*.' *Molecules*. Vol. 23. No. 10. 2018. Pp1-15.
[329]Al-Snafi. 'The Pharmacological Importance of Bellis Perennis – A Review.' *International Journal of Phytotherapy*. Vol. 5. No. 2. Pp 63-9.
[330]Moreno Ollala (ed.), *Lelamour Herbal*. Pp139, 287-8. Appendix: 25A-L.
[331]Mount, Medieval Medicine; It's Mysteries and Science. P113.
[332]Moreno Ollala (ed.), *Lelamour Herbal.* Pp139, 287-8. Appendix: 25A-L.

This entry does have limited annotation; Hand F repeats the text's note of being useful for speech. Hand C, however, adds new information, providing us with a slightly confusing temperament of hot and dry 'moyst'.[333] The source for this entry is the *Agnus castus,* where it is used for sleep. Both Brodin and Olalla believe the plant discussed in the entry to be Deadly Nightshade, but Brodin discusses that other authors thought *Solanum nigrum*, *Datura stramonium* and mandrake were possible alternatives.[334] There does not appear to be any Arabic influence within this particular entry.[335]

Deadly Nightshade is known predominantly as a narcotic. However, there are some limited indications that it could be not only narcotic, but anti-inflammatory: one of the plant's constituents responsible for its deadly effects (Atropine) also has anti-inflammatory effects.[336]

Atropine has been studied for its anti-inflammatory benefits in relation to sepsis. Atropine creates a muscarinic acetylcholine receptor response known as mAChR in LPS treated mice. LPS treatment is used because it mimics sepsis. Atropine given before an inflammatory response caused lowered TNF-a and IL-10 without impacting IL-6 and also caused improved recovery rate from endotoxic shock. This suggests atropine has a beneficial clinical effect in relation to sepsis. There is a need for an anti-inflammatory drug in relation to sepsis is due to the condition being caused by a high-level inflammatory response, characterized by a rapid release of TNF-a, interleukins, and other cytokines. High IL-6 and TNF-a levels are associated with high mortality in sepsis and thus a drug that could control this would be valuable. The inflammatory response can be regulated through the neuroendocrine system – sympathetic and parasympathetic nervous systems, inhibiting at systemic and regional levels. The cholinergic anti-inflammatory pathway has been identified between the

[333]*Ibid.* Pp139-287-8: Appendix*: 25A-L.*
[334]*Ibid.* Pp139, 287-8. Appendix: 25A-L: And: Brodin. *Agnus castus: A Middle English herbal reconstructed from various manuscripts: Edited with introduction, notes and glossary by Gosta Brodin*.Pp205, 248-9.
[335]*Ibid. Pp139, 287-9:* Appendix: 25 A-L: and: Brodin. *Agnus castus: A Middle English herbal reconstructed from various manuscripts: Edited with introduction, notes and glossary by Gosta Brodin*.Pp205, 248-9.
[336]J. M. Fuentes, W. B. Fulton, D. Nino, M. A. Talamini, A. D. Maio. 2008. 'Atropine treatment modifies LPS-induced inflammatory response and increases survival.' *Inflammation Research*. Vol. 57. Pp1-7.

vagus nerve and immune system, and it is thought that this gives neural control of acute inflammation as an 'inflammatory reflex'. Previous studies have indicated anesthetics modified the inflammatory process and improved survival from endotoxic shock. Atropine inhibits TNF-a and modulates inflammatory processes if administered after an endotoxin 'challenge'. It also reduces activation of NF-kB if used as pre-treatment. Inflammation is a major player in conditions such as infection, sepsis, injury, ischemia and cancer and thus anti-inflammatories are an important part of medical treatment. Inflammation is regulated by cytokines, hormones and prostaglandins. [337]

Inflammation can be influenced by the nervous and endocrine systems. Particularly the parasympathetic nervous system mediated by the vagus nerve. The release of Acetylcholine post-vagus nerve activation creates a 'negative-feedback control' on inflammation – 'cholinergic anti-inflammatory pathway'. Anesthetics also modulate the model inflammation, not through the vagus nerve-controlled pathways but through inhibitory treatment does reduce inflammatory response. [338]

Catecholamines found in the plant may also be involved in limiting TNF, interleukins, and macrophage inhibitory protein 1-a. Decreased TNF-a appears to allow resistance to shock. Acetylcholine inhibited pro-inflammatory cytokines but not anti-inflammatory cytokines. Ach activity appears dependent on a cholinergic interaction with a7nAChR (associated with anti-inflammatory action). Atropine acts as an anti-inflammatory although as an mAChR antagonist it would generally be expected to go against this (*in vivo*). This effect could be down to direct interaction of atropine with immune cells or secondary effects. Atropine could alter hormones affecting inflammatory process. A decrease in TNF-a after atropine treatment could also be related to pharmacokinetic and pharmacodynamic properties of the compound used (Atropine sulfate). Atropine treatment in relation to IL-10 may be relevant to parasympathetic nervous system. The study indicates a correlation between the elevated production of pro-inflammatory cytokines (such as TNF-a and IL-6)

[337]Fuentes, Fulton, Nino, Talamini, Maio, 'Atropine treatment modifies LPS-induced inflammatory response and increases survival.' Pp1-7.
[338]*Ibid* Pp1-7.

and mortality in septic shock. IL-10 however increases survival. As with many of the above studies the plant's beneficial effects need further research but could have large clinical impact once better understood.[339]

Nightshade may also be a potential Parkinson's disease treatment. The previously mentioned alkaloids atropine, hyoscyamine and scopolamine are beneficial for the disease and are actually in some commercially available Parkinson's disease drugs. Again, here we see a potential anti-inflammatory plant being neuroprotective, and thus has potential for treating Parkinson's, Alzheimer's, and dementia. Nightshade is traditionally used as narcotic, painkiller, anti-spasmodic, anticholinergic, diuretic, and for rheumatism, fever, night sweats, epilepsy, cancer and pupil dilation.It can also be used as an antidote to intoxication from morphine, pilocarpine and muscarine. [340]Atropine, scopolamine, anisodine, anisodamine all inhibit stimulant acetycholine covered in the first article discussed.[341] Thus, although this article does not look at Nightshade specifically as an anti-inflammatory it reinforces the above article.[342] The plant also acts as a diuretic which could also help to lower inflammatory factors through expulsion. Uricosuric substances (which promote uric acid excretion) for anticholinergic agents are beneficial for osteoarthritis.[343]

Atropine has also been tested for its effects against scorpion venoms which causes a strong inflammatory response, which also causes potentially fatal lung oedema. This effect could be through inflammation or cardiogenesis. Catecholine may cause lung oedema by augmenting IL-6. Muscarinic antagonists like Atropine may prevent inflammatory responses, by reducing neutrophil

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[339]*Ibid.*Pp1-7.

[340]I. Banjari, T. Marček, S. Tomić, V. Y. Waisundara. 2018. 'Forestalling the Epidemics of Parkinson's Disease Through Plant-Based Remedies.' *Frontiers in Nutrition*. Vol. 5. October. Pp1-9.

[341]*Ibid.* Pp1-9*:* See also: Fuentes, Fulton, Nino, Talamini, Maio, 'Atropine treatment modifies LPS-induced inflammatory response and increases survival.'. Pp1-7.

[342]Banjari, Marček, Tomić, Waisundara, 'Forestalling the Epidemics of Parkinson's Disease Through Plant-Based Remedies.' Pp1-9.

[343]R. Choopani, A. Ghourchian, H. Hajmehdipoor, M. Kamalinejad. 2016. 'Scientific Evaluation of Pharmacological Treatment of Osteoarthritis in the *Canon of Medicine*.' *Journal of Evidence-Based Complementary & Alternative Medicine*. Vol. 21. No. 3. Pp235-42.

access to the lungs for example. Both venoms used in the study increased pro-inflammatory cytokines (IL-1B, IL-6 and IL-10). The venom causes rapid accumulation of pro-inflammatory cells in the lungs causing edema, and this influx is seen in many pulmonary diseases. Atropine administration reduces this influx. Again, here we see a cholinergic response as with above studies, reducing inflammation. Atropine also blocks immune cells from migrating towards the site of the inflammation, stopping progression of the inflammatory response. Atropine as found to reduce inflammation but did not affect lung oedema. [344]

Deadly Nightshade has also been identified as beneficial in wound healing, treating skin conditions, as an anti-inflammatory, and in angiogenesis. The alkaloids contained in the plant such as hyoscamine, atropine, scopolamine have been found to shorten the inflammatory process. As with the above study the plant was found to act in both inhibitory and stimulatory ways, but it significantly lowered levels of inflammatory cells. This means in treating inflammation of the skin it allows the epidermis to regenerate and would also be beneficial in conditions such as cancer in which keratinocytes are activated through muscarinic receptors, which atropine, hyoscamine and scopolamine modulate. Therefore, despite the plant's deadly reputation it has beneficial potential in relation to inflammation and wound healing. [345]

[344]H. Saidi, S. Adi-Bessalem, D. Hammoudi-Triki, F. Laraba-Djebari. 2013. 'Effects of atropine and propranolol on lung inflammation in experimental envenomation: comparison of two Buthidae venoms.' *Journal of Venomous Animals and Toxins including Tropical Diseases*. Vol. 19. Pp1-7.

[345]P. Gál, T. Toporcer, T. Grendel, Z. Vidová, K. Smetana Jr, B. Dvořánková, T. Gál, Š. Mozeš , L. Lenhardt, F. Longauer, M.Sabol, J. Sabo, M. Bačkor. 2009. 'Effect of *Atropa belladonna* L. on skin wound healing: Biomechanical and histological study in rats and in vitro study in keratinocytes, 3T3 fibroblasts, and human umbilical vein endothelial cells.' *Wound Repair and Regeneration*. Vol 17. No. 3. Pp378-386.

Remedy 20: Erbe Robert/Herba roberti

This particular entry is a brief one. The plant identified here is *Geranium robertianum* L. The entry compares the plant to 'herbe benet' with a red stalk and flower and smelled like the 'chafynge of a fox'. The plant is given as a treatment for healing wounds and destroying cancer. No other ingredients are given, and no temperament has been presented either. The source for this particular entry is the *Agnus castus* and the entry is actually more detailed than the source. Olalla also identifies the entry 'maworte' as a possible repetition of the same plant, and source but identification in this latter entry is unsure given that the properties discussed in the second entry do not agree with the former. There is no obvious Arabic influence in this entry. [346]

Herb Robert has been found to be antioxidant, ant-inflammatory, anti-microbial, anti-hyperglycaemic, cytotoxic, haemostatic, antibacterial, antiallergic, diuretic, antihepatotoxic, and tonic. The plant contains tannins (proanthocyanadins), flavonoids (quercetin, kaempferol, hyperoside, rutin), and phenolic acids (gallic and ellagic). Lectins which are anti-cancerous are also found in Herb Robert. The plant can be used medically but it can contain heavy metals accumulating via pollution, thus awareness needed in sourcing the plant. Herb Robert is an antioxidant like many of the plants above and showed higher activity than that of Trolox, a drug used as a control. The plant acts as an anti-inflammatory through scavenging HOCl which is a strong oxidant produced by neutrophils, important in the inflammatory process. Anti-hyaluronidase and anti-elastase properties against enzymes that degrade extracellular matrix, a process which has a role in many diseases with inflammatory background have also been discovered.[347] It also contains urolithins which are detrimental to pro-inflammatory macrophages (several are also potent antioxidants). Once again, we also see reference to an anti-inflammatory plant being used in diabetes (mellitus) treatment due to an anti-hyperglycaemic property. Enzyme inhibitors against urease and a-chymotrypsin also

[346]Moreno Ollala (ed.), *Lelamour Herbal.* Pp 141, 292-3, 355-7. Appendix: 26A-L.
[347]V. C. Graça, I. C. F. R. Ferreira, P. F. Santos. 2016. 'Phytochemical composition and biological activities of *Geranium robertianum* L.: a review.' *Industrial Crops and Products*. Vol. 87. September. Pp363-378.

appear here; Urease aids bacteria that cause peptic ulcers and gastric cancer. a-Chymotrypsin targets protease inhibitors, which acts as a cancer chemoprotective agent. Acetylcholinesterase found in the plant is a target for Alzheimer's disease as its caused by decreasing acetylcholine levels (see remedy 19). Cytotoxicity is another property held by a plant indicating Lelamour's usage is correct. The study suggests particular effectiveness against epidermoid laryngeal carcinoma and monkey kidney cells, whilst also having a low cytotoxicity against healthy cells. Both the study and Lelamour's remedy suggest traditional and historical usage of this plant are indeed correct. [348]

Herb Robert is also suggested to have another cytotoxic component. The plant contains small quantities of radium, which is radioactive. However, this mean ingestion may need to be limited. Low quantities of radium could be cytotoxic under prolonged medical starvation conditions. The combination of cytotoxic radium and medical starvation means cancer mechanism are inhibited. Cancer cells metabolic rate is lowered, and cytotoxicity kills cancer cells. The relatively low cytotoxicity caused by this combination means it is less likely to cause immune or hormonal suppression compared to other cancer treatment options such as chemotherapy.[349] A further study reinforces the one discussed above; again, the plant is identified as anti-inflammatory, *anti-cancer* and antioxidant, with the addition that Herb Robert is also cytostatic *in vitro.*[350]

The antioxidant activity as previously indicated is partially down to scavenging HOCl. Antioxidant and anti-inflammatory properties of the plant also function through inhibition of TNF-a production and prostaglandin modulation. Flavonoids and phenolics such as those discussed in the previous sources, play a role in the prevention of diseases that involve oxidative stress. They create protection for cells due to scavenging nitrogen, chlorine and oxidative species. This is suggested to

[348]Graça, Ferreira, Santos. 'Phytochemical composition and biological activities of *Geranium robertianum* L.: a review.'Pp363-378.
[349]M. R. Ponizovskiy. 2012. 'The Detailed Description Mechanisms of the Herbs Extracts Operations in the New Method Cancer Disease Treatment via the Rearrangement of Metabolism from Pathological Development into Normal Development.' *Journal of Clinical Trials*. Vol. 2. No. 4. P1-10.
[350]E. Neagu, G. Paun, D. Constantin, G. L. Radu. 2017. 'Cytostatic activity of *Geranium robertianum* L. extracts processed by membrane procedures.' *Arabian Journal of Chemistry*. Vol. 10. No. 2. Pp S2547-53.

be particularly important for gastrointestinal tract protection from oxidative damage, and delaying stomach, colon and rectal cancer. Flavonoids are also modulatory, influencing signal transduction in cells mediated by oxidants which can activate the NF-kB pathway. NF-kB regulates expression of cytokines and chemokines that escalate inflammation. [351]

[351]S. Amaral, L. Mira, J. M. F. Nogueira, A. P. da Silva, M. H. Florêncio. 2009. 'Plant extracts with anti-inflammatory properties – A New approach for characterization of their bioactive compounds and establishment of structure-antioxidant activity relationships.' *Bioorganic & Medicinal Chemistry*. Vol. 17. No. 5. March. Pp1876-83.

Discussion: Chapter 3

Themes

This chapter aims to cover the themes, patterns and issues uncovered during research. There are two particular themes in the above entries that warrant some attention. One theme here is that the majority of the chosen entries are those that Lelamour has compiled from Macer Floridus's *De Viribus Herbarum*.[352] The second is that the majority of these entries all have the same temperament, where given; hot and dry. It is entirely possible that this is a result of Lelamour's practice of compilation and copying from his sources. However, there is a relationship between the fact that many of these hot and dry remedies are also anti-inflammatory. Many of the remedies refer to swelling and gout (causing pain), which under humoural theory would have been caused by the pooling of cold, moist humours, thus requiring something that could draw them out (heat or lack of moisture), in order to remove them from the body.[353] Out of the twenty sampled remedies, eleven have a temperament of either hot and dry, or dry. Out of the ninety-three remedies featured in the Appendix, fifty have a temperament provided, and forty-one of those have a temperament of hot, dry or a combination of the two. Therefore, there is a strong correlation between the hot and dry temperament, and anti-inflammatories. [354] From a more modern perspective, in many cases heat is applied to pain in order to soothe muscles. Therefore, the idea of using heat to treat pain is certainly not an alien concept. Although medieval physicians would not have understood the way plants worked at the detailed chemical level we do today, in using these plants on their patients they would have seen which herbs were effective.[355]

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[352]Moreno Ollala (ed.), *Lelamour Herbal*. Pp115-293.

[353]*Ibid.*Pp115-293: and: Porter, *The Greatest Benefit to Mankind: A Medical History of Humanity from Antiquity to the Present.* Pp 56-7: See also: Hartnell. *Medieval Bodies: Life, Death and Art in the Middle Ages.* Pp12-15.

[354] See Remedies 1-20 and Appendix.

[355]Moreno Ollala (ed.), *Lelamour Herbal*. Pp11-510: and: Jha. 2006: and Jo, Lee, 'Heath therapy for primary dysmenorrhea: A systematic review and meta-analysis of its effects on pain relief and quality of life.' Pp1-8: See also: Harrison, Roberts, Gabrilska, Rumbaugh, Lee, Diggle, 'A 1000-year-old Antimicrobial Remedy with Antistaphylococcal Activity.' Pp1-7: and: Furner-Pardoe, Anonye, Cain, Moat, Ortori, Lee, Barrett, Corre,

A separate note to make here is that despite the focus of the thesis on plants, overall interactions between plants and other ingredients such as wine, honey, and vinegar would also need to be taken into consideration if any of these remedies were to be looked at in further depth. The study of the eye salve from Bald's Leechbook provides us with an example of this. Ancientbiotics' research, has shown that whilst components such as wine are included in the remedy, removing them has relatively little effect on the overall effectiveness of the remedy. It is postulated however, that the wine may act as a solvent helping to dissolve the active ingredients from the plant material, and make it easier for chemicals to interact. Each individual component of the remedy also has a very limited effect on its own, it is the combination of the mixture that makes it effective, attacking the infection on several levels at once.[356] Thus, where many of the remedies contain other ingredients that have not been discussed above, interactions these additional ingredients may create in the remedies would certainly be worth further research. The same study also explains that removing any of the plant-based constituents of the remedy significantly hinders its effectiveness, showing how interactions between the plants is crucial for potency of the remedy. Therefore, much like the remedy tested from Bald's Leechbook, further research on the effectiveness of the above remedies would benefit from lab work further research by scientists. [357]

Harrison, 'Anti-biofilm efficacy of a medieval treatment for bacterial infection requires the combination of multiple ingredients' Pp1-14.

[356]Harrison, Roberts, Gabrilska, Rumbaugh, Lee, Diggle, 'A 1000-year-old Antimicrobial Remedy with Antistaphylococcal Activity.'Pp1-7: And: Furner-Pardoe, Anonye, Cain, Moat, Ortori, Lee, Barrett, Corre, Harrison, 'Anti-biofilm efficacy of a medieval treatment for bacterial infection requires the combination of multiple ingredients' Pp1-14.

[357]Moreno Ollala (ed.), *Lelamour Herbal*. Pp11-510: And: Furner-Pardoe, Anonye, Cain, Moat, Ortori, Lee, Barrett, Corre, Harrison, 'Anti-biofilm efficacy of a medieval treatment for bacterial infection requires the combination of multiple ingredients' Pp1-14: And Harrison, Roberts, Gabrilska, Rumbaugh, Lee, Diggle, 'A 1000-year-old Antimicrobial Remedy with Antistaphylococcal Activity.' Pp1-7: and: Ernst. 'The efficacy of herbal medicine – an overview.' Pp405-9. Pp405-9.

Arabic Influence

Arabic authors are not directly cited in the *Lelamour Herbal*, however, their influence is inherent in medieval medicinal texts such as Lelamour. Arabic authors acted as conduits for both Greek and eastern thought that was amalgamated into Western medicine.[358] However, although it is not obvious, this does not mean it is necessarily absent; modern research may suggest similarities to traditional eastern medicinal practices, as seen in remedies 2 and 3. Lelamour's 'main' source, Macer Floridus's *De viribus herbarum* also has little apparent Arabic influence, as referenced by Keiser[359] and Flood.[360] However, the presence of several unidentified texts used as sources for the herbal means that it is possible that some Arabic influence could be present, especially given that Lelamour is thought to have come from an educated background and likely had access to an academic library in which Arabic authors, or texts transmitted by them may have been found. Indeed, many eastern ideas had been subsumed into western medicine by the time of the herbal's compilation, meaning that the lack of apparent Arabic authorship could have been a conscious choice by Lelamour, or a result of the material available to him, but given the integration of Arabic thought into the West it is likely to have had some impact on Lelamour's writings, even indirectly.[361]

[358]Edriss, Rosales, Nugent, Conrad, Nugent, 'Islamic medicine in the Middle Ages.' P223-229: See also: V. P. De Bustinza. 2016. *How Early Islamic Science Advanced Medicine*. Available from: https://www.nationalgeographic.com/history/magazine/2016/11-12/muslim-medicine-scientific-discovery-islam/. Accessed: 5/2/21]: and Porter, *The Greatest Benefit to Mankind: A Medical History of Humanity from Antiquity to the Present*, P106: See also: Siraisi. *Medieval & Early Renaissance Medicine: An Introduction to Knowledge and Practice*. Pp12-59, 140,142-3.

[359]Keiser, 'Reconstructing Robert Thornton's Herbal.' Pp35-53.

[360]Flood, 'The Medieval Herbal Tradition of Macer Floridus.' Pp62-66.

[361]Porter, *The Greatest Benefit to Mankind: A Medical History of Humanity from Antiquity to the Present*, P106: See also: Siraisi, *Medieval & Early Renaissance Medicine: An Introduction to Knowledge and Practice*, Pp12-59, 140,142-3.

Hands

The various hands and annotations of the herbal also provide valuable insight into the workings of medical minds of the late medieval period, and their views on the text, from edits correcting scribal errors to working notes on the effectiveness of the remedies. This indicates that not only was the *Lelamour Herbal* distributed and read, but that it was actively used and tested. The fact that we have notes in successive hands would suggest that its remedies enjoyed at least some success in their deployment. Corrections made by those such as Dod may have aided in ensuring the remedies' effectiveness. Thus, we have a view into working medical minds of the period and the way they used the manuscript. [362]

Modern Herbals and rise in traditional/complementary medicine

As discussed in Chapter 1, public interest is returning to traditional, or complementary medicine. This is partly due to the belief that traditional medicine, based largely upon herbs, is safer due to being more natural. Whilst this is not always the case (the use of St. John's Wort, for example, can have serious side effects)[363], there is an acknowledgement within the medical community that herbal-based medicines may form a viable alternative to certain synthetic medicines, particularly those that have a large number of side effects such as NSAIDs. Knowledge of natural products and foraging is becoming increasingly mainstream as people look for alternatives. Aspects of traditional Chinese medicine such as acupuncture, and Ayurvedic (Indian) medicine such as yoga are also becoming mainstream health treatments because they are beneficial and have relatively few side effects. This potential for reduced side effects, both in herbal treatments and traditional, holistic medicinal practices are referenced in modern medical articles researching older forms of medicine,

[362]Moreno Ollala (ed.), *Lelamour Herbal.* Pp68-80, 115-293.
[363]Ross, Simpson, McLay, 'Homeopathic and herbal prescribing in general practice in Scotland,' Pp647-652.

for the reasons discussed above.[364] There are also widely accessible 'modern' herbals and foraging books available. Greive's herbal was created to present encyclopedic knowledge,[365] and others such as Nozedar's were constructed to provide basic education, aimed at readership with children.[366] Knowledge of herbs and wild foods appears to be gaining popularity as healthy eating has become more prominent within social consciousness: Fowler lists basil, bugle, dill, fennel, and garlic, and their uses according to her knowledge. Hundreds of years after the formation of the *Lelamour Herbal*, these plants are still viewed as medicinally beneficial within herbalism.[367] Grieve's more encyclopedic herbal, although much earlier than Fowler's herbal, also covers some of the plants discussed in the *Lelamour Herbal* such as Agrimony, Betony, Birthwort, Bugle, Great burnet, Lesser burnet, Greater celandine, Lesser celandine, Wild celery, and Centaury.[368] Thus, looking at the contents of the *Lelamour Herbal* with a view to considering its application to modern medicine is an activity that fits in well with current academic research. The remedies would also be a potential source for Complementary and Alternative Medicinal treatments as the contents of these remedies are herbal, as well as providing a base for conventional medicines based on extraction of the active ingredients.[369]

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[364]Dinarello, 'Anti-inflammatory Agents: Present and Future.'. Pp935-950. See also: Khayrullina, Mukhametov, Tjurina, Garifullina, Gerchikov, Zarudiy, 'Nonsteroidal Anti-Inflammatory Drugs: I. A Study of "Structure-Efficacy of the Anti-Inflammatory Effect Relationship Activity.' Pp305-312: Rahmani, Alsahli, Ali, Khan, Aldebasi, 'Role of Curcumin in Disease Prevention and Treatment.' Pp1-9: and: Prasad, Aggarwal, Chapter 13: Turmeric, the Golden Spice: In: Benzie, Wachetl-Galor, Herbal Medicine: Biomolecular and Clinical Aspects.

[365]Grieve, Leyel (eds.), *A Modern Herbal* Pp3-912.

[366]Nozedar, *Foraging with kids: 52 Wild and Free Edibles to Enjoy with Your Children*, Pp1-224.

[367]Fowler, *A Modern Herbal*. Pp4-21. Pp48-52, 58-60, 90-3, 101-4, 108-116.

[368]Grieve, Leyel (eds.), *A Modern Herbal* Pp12-15, 97-99, 104, 139-141, 145-6, 146-7, 178-179, 179-84.

[369]Ross, Simpson, McLay, 'Homeopathic and herbal prescribing in general practice in Scotland,' Pp647-652: And: Ernst. 'The efficacy of herbal medicine – an overview.' Pp405-9. Pp405-9.

Article Patterns

Reading through the remedies above, it should be clear to the reader that many of the plants discussed work on more than one level, being anti-inflammatory and antioxidant, for example. Throughout the remedies it is clear that anti-inflammatory properties appear to be combined with antioxidant, anti-cancer, anti-diabetic, and neuroprotective qualities as well. These properties mean the herbs above could act as potential treatments for a wide range of illnesses and ailments. This opens up an avenue of research for modern medicine, which as seen by the above research has been opened. However, research remains to be done with the mechanisms behind these properties still little understood in many plants, meaning further clinical trialing is needed. However, this shows that alternative sources of medicine, such as Persian, Chinese and Ayurvedic medicine do have significant merit in their usage of herbs, and that despite the issues surrounding testing herbal medicines, many could well provide viable alternatives or complementary therapies to conventional drugs.[370] In some cases, such as anti-cancer drugs, they may be able to aid treatment and reduce side effects, for example.[371] For diseases such as Alzheimer's and Parkinson's that are difficult to treat, opening this route of research further may enable medicine to find cures to produce or synthesize drugs that are not currently available. [372]

[370]Hosseinkhani, Falahatzadeh, Raoofi, Zarshenas, 'An Evidence-Based Review on Wound Healing Herbal Remedies From Reports of Traditional Persian Medicine' Pp334-343: and: The Editors of the Encyclopedia Britannica. N.d. *Herbal Therapy. In: Traditional Chinese Medicine*. Available from: https://www.britannica.com/science/traditional-Chinese-medicine/Herbal-therapy. [Accessed: 20/9/21]: and: Prasad, Aggarwal, *Chapter 13: Turmeric, the Golden Spice*: In: Benzie, Wachetl-Galor, Herbal Medicine: Biomolecular and Clinical Aspects: and: Lad, (N.d)

[371]See Remedies 2, 9, 12, 14,17,18, and 20.

[372]See Remedies 9, 19, and 20.

Plant Constituents

Reading through the research on the above remedies, some repetition of compounds in the plants would perhaps be expected given the focus on anti-inflammatories. However, the majority of plants share similar compounds, albeit in differing quantities and derivatives. Throughout the research quercetin,[373] kaempferol,[374] hyperoside,[375] rutin,[376] isorhamnetin,[377] anthocyanins, anthocyanidins, and proanthocyanadins[378] have reappeared and their beneficial anti-inflammatory and antioxidant properties discussed. This array of compounds spread throughout the many species discussed gives us an indication of why herbal remedies despite their issues, are so popular – these studies indicate that the active ingredients found in these plants may well be effective. If conventional medicine is to take testing of these compounds and combinations of them further then new drugs to treat a variety of ailments may be available, as the Bald's Leechbook study shows is possible.[379] Alongside this, it may also act to validate the more holistic practices involved in CAM, such as homeopathy, herbal medicine and traditional medicine systems, enabling better integration into the mainstream. More testing of herbal medicines and clinical trials will create an evidence-base that will encourage the adoption of treatments and practices into the mainstream. This would also enable patients to pick and choose treatments more effectively, and give practitioners better knowledge of the benefits, risk and interactions of the herbs with prescribed drugs.[380] Furthermore,

[373]See Remedies 1, 2, 7, 11, 13, 14, 17, 18, 20.
[374]See Remedies 1, 11, 13, 16, 17, 18, 20.
[375]See Remedies 16, 18, 20.
[376]See Remedies 11, 18, 20.
[377]See Remedies 1, 13, 16, 17, 18,
[378]See Remedies 3, 4, 6, 9, 10, 18, 20.
[379]Harrison, Roberts, Gabrilska, Rumbaugh, Lee, Diggle. A 1000-year-old Antimicrobial Remedy with Antistaphylococcal Activity. Pp1-7: and: Furner-Pardoe, Anonye, Cain, Moat, Ortori, Lee, Barrett, Corre, Harrison, 'Anti-biofilm efficacy of a medieval treatment for bacterial infection requires the combination of multiple ingredients' Pp1-14.
[380]Ernst. 'The efficacy of herbal medicine – an overview.' Pp405-9. Pp405-9: See also Hosseinkhani, Falahatzadeh, Raoofi, Zarshenas, 'An Evidence-Based Review on Wound Healing Herbal Remedies From Reports of Traditional Persian Medicine' Pp334-343: and: The Editors of the Encyclopedia Britannica. N.d. *Herbal Therapy. In: Traditional Chinese Medicine*. Available from: https://www.britannica.com/science/traditional-Chinese-medicine/Herbal-therapy. [Accessed: 20/9/21 Wu,

it would also indicate that the historical medicine that many would, at a glance, dismiss is actually more effective than it first appears. Given the 'lack' of medical understanding during the medieval period in comparison to today's knowledge, the fact that all of the above remedies have matching articles available suggest that modern medicine may have something to gain from looking to the past. The remedies above are only a portion of those identified from the *Lelamour Herbal* with potential anti-inflammatory or anti-cancer properties. The remaining remedies may well expand further on this research and reveal additional potential both for drugs and understanding.[381] Out of 93 identified remedies only 20 have been dealt with in this dissertation, thus there is plenty of scope available for further research on the anti-inflammatory entries of the herbal alone. Out of the ninety-three remedies identified as potential anti-inflammatories, ten proved to have no conclusive literature available and thus would need further research in order to identify whether they hold *any* anti-inflammatory properties, and the remaining seventy-three require more research into their anti-inflammatory properties and efficacy.[382]

It would also indicate that there is also something to be learnt from the more holistic medicinal systems. Medieval medicine believed that the body was much more interconnected to the outside world - an open circuit – whereas in modern medicine it is arguably seen as a sealed unit. Holistic systems are more akin to medieval practice in some respects and therefore this is another aspect of treatment that needs to be considered.[383]

Lin, Panny, Chang, Lin, Tung, Chang. 'Effect of the Chinese Herbal Medicine SS-1 on a Sjögren's Syndrome-Like Disease in Mice.' Pp1-14.

[381]Moreno Ollala (ed.), *Lelamour Herbal*. Pp 115-293: See Remedies 1-20.

[382]See Remedies 1-20 and Appendix: See also: Moreno Ollala (ed.), *Lelamour Herbal.* Pp 115-293

[383]Prasad, Aggarwal, *Chapter 13: Turmeric, the Golden Spice*: In: Benzie, Wachetl-Galor, *Herbal Medicine: Biomolecular and Clinical Aspects*: and Ross, Simpson, McLay, 'Homeopathic and herbal prescribing in general practice in Scotland,' Pp647-652: and Hosseinkhani, Falahatzadeh, Raoofi, Zarshenas, 'An Evidence-Based Review on Wound Healing Herbal Remedies From Reports of Traditional Persian Medicine' Pp334-343.: and: Oberbaum, Spira, Lukasiewicz, Armon, Samuels, Singer, Barak, Izbicki, Einav, Hersch, 'Effect of Traumeel S on Cytokine Profile in Cecal Ligation and Puncture (CPL) Sepsis Model in Rats.' Pp909-913.

Issues

One of the issues with researching the properties of these herbs is that in some cases, little research is available on one plant.[384] A repeating phrase that is seen in many of the articles is that the mechanism of the compounds found within the plants need further elucidation.[385] The testing of herbal medicines is harder than that of synthetic due to additional variables such as climate, soil, location, and variations in species of plants. Combination drugs with several herbs magnify this further as these variables are then, multiplied across multiple plants involved in a drug.[386] Although this may make testing harder, research on these combinations may help modern science to find new treatments for medical issues, as the Bald's Leechbook study indicates in relation to MRSA through drugs that attack an issue in multiple ways. It may also help to expand understanding on disease and illnesses that we currently struggle to treat. [387]

Another aspect here, is the issue of plant identification previously discussed. The identifications made by Olalla are in many cases based on textual traditional due to lack of description and others are tentative due to uncertainty between sources, names, and pharmacological attributes. Where there is more than one possible candidate, both would need further testing in order to ascertain which plant is likely to be the correct one for the remedy. Although this is to a point problematic, it also means that a larger variety of plants, and therefore potential drugs and information could be made available. Medieval authors did not distinguish between plants in the same way we do today, many sharing names, or being grouped as the same plant. However, with further investigation it may be found that in some cases these plants did have similar medicinal functions, and therefore from a

[384]See Remedies 3, 5, 9, 12.
[385]See Remedy 19.
[386]Ernst. 'The efficacy of herbal medicine – an overview.' Pp405-9.
[387]Harrison, Roberts, Gabrilska, Rumbaugh, Lee, Diggle. A 1000-year-old Antimicrobial Remedy with Antistaphylococcal Activity. Pp1-7: and: Furner-Pardoe, Anonye, Cain, Moat, Ortori, Lee, Barrett, Corre, Harrison, 'Anti-biofilm efficacy of a medieval treatment for bacterial infection requires the combination of multiple ingredients' Pp1-14.

pharmacological perspective, needing an accurate distinction between *some* plants may not have been necessary.[388]

[388]Moreno Ollala (ed.), *Lelamour Herbal*. Pp84-91, 115-293.

Conclusion

This study has discussed the contents of the *Lelamour Herbal* regarding its anti-inflammatory contents, and their efficacy. Only a small sample of target remedies have been shown here, and each entry's contents go beyond just anti-inflammatory properties. This means that there is further potential here in terms of other possible types of treatment and further research to see whether other remedies would also be medically beneficial.[389] Despite this, the above discussion proves that the *Lelamour Herbal* does show considerable promise as a resource for anti-inflammatory drugs, and indeed many plants contained within the herbal are already being researched, and tested,[390] due to the resurgence of interest in traditional medicine and a global need for new medicines.[391] Several of the scientific articles mentioned such as A. Hosseinkhani et al., specifically discuss the history, traditional usage, and potential benefits of 'looking back' at plant-based medicines for 'new' drug sources.[392] Added to this, studies by Ancientbiotics[393] and work by Erin Connelly[394] also go to show how we have underestimated medieval medicinal knowledge, potentially quite significantly. This indicates that our impressions of medieval medicine as an inferior precursor to modern medicine needs challenging, and this previously held perspective is already starting to change. Many of these remedies have clear potential. With further pre-clinical and clinical testing some of the plants and their constituent chemicals could be used alongside or even to replace modern drugs, particularly

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[389]See Remedies 1-20: See also: Moreno Ollala (ed.), *Lelamour Herbal*. Pp 115-293.

[390]See Remedies 1-20: See also: Moreno Ollala (ed.), *Lelamour Herbal*. Pp 115-293.

[391]McCarthy, *Superbugs: The Race to Stop and Epidemic*, P1-5: See also: Fowler,*A Modern Herbal*. Pp4-21: : Moreno Ollala (ed.), *Lelamour Herbal* Pp1-301: and: Hosseinkhani, Falahatzadeh, Raoofi, Zarshenas, 'An Evidence-Based Review on Wound Healing Herbal Remedies From Reports of Traditional Persian Medicine' Pp334-343: The Editors of the Encyclopedia Britannica. N.d. *Herbal Therapy*. In: Traditional Chinese Medicine. Available from: https://www.britannica.com/science/traditional-Chinese-medicine/Herbal-therapy. [Accessed: 20/9/21]: and: Prasad, Aggarwal, Chapter 13: *Turmeric, the Golden Spice*: In: Benzie, Wachetl-Galor, Herbal Medicine: Biomolecular and Clinical Aspects.

[392]Hosseinkhani, Falahatzadeh, Raoofi, Zarshenas, 'An Evidence-Based Review on Wound Healing Herbal Remedies From Reports of Traditional Persian Medicine' Pp334-343.

[393]Harrison, Roberts, Gabrilska, Rumbaugh, Lee, Diggle, 'A 1000-year-old Antimicrobial Remedy with Antistaphylococcal Activity.'. Pp1-7. And: Furner-Pardoe, Anonye, Cain, Moat, Ortori, Lee, Barrett, Corre, Harrison, 'Anti-biofilm efficacy of a medieval treatment for bacterial infection requires the combination of multiple ingredients' Pp1-14: and: Medievalists.net, 2020.

Connelly, Künzel (eds.), *New Approaches to Disease, Disability and Medicine in Medieval Europe*, Pp126-140.

NSAIDs, whose side effects can be problematic. Thus, although the remedies compiled in the *Lelamour Herbal* are several hundred distant, somewhat paradoxically, they are still very much relevant to the needs of both medicinal disciplines, and to patients today.[395] In moving away from its historical roots, it appears modern medicine may have missed a few tricks.

Word Count: 27956.

[395]Moreno Ollala (ed.), *Lelamour Herbal*. P11-510.

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