

Introduction

The Economic Botany Collection at the Royal Botanic Gardens, Kew contains the Royal Pharmaceutical Society's 19th Century educational Materia Medica cabinets (Fig. 2,3). Within these, *Eucalyptus* spp. contributes the largest section of essential oil bottles (117 specimens; 80 species) demonstrating the depth of historical interest in its medicinal properties^[1]. However, only three species (*E.globulus*, *E.smithii* & *E.polybractea*) are now accepted medicinally^[2,3] leading the question of how this medicine developed.

Historical medical collections such as this contain a wealth of unexplored objects and documentation that may reveal sources of medicine worth revisiting^[4]. With the rise in antibiotic resistance globally, revisiting Eucalyptus in particular may prove a valuable exercise in finding an effective, accessible and sustainable medicine^[5].

Aim

An exploration of 150 years of artefacts and paper scientific records (n=1,557) to map the development and acceptance of *Eucalyptus* into conventional medicine.

Methods

To analyse both numeric and textual data, thematic content analysis was used on the following data:

- The oil bottles from the collection, their packaging and related documentation
- Articles & Correspondence from the *Pharmaceutical Journal (PJ)*, *British Medical Journal (BMJ)* and *The Lancet (TL)* from their inception in the 19th Century to 1970



Figure 2: (L) Royal Pharmaceutical Society's Materia Medica cabinet & a close up of one of the Eucalyptus essential oil drawers; Figure 3: (R) A 19th Century essential oil bottle from the drawer.

Results

'Discovery' & Introduction to Europe

- Eucalyptus* was first 'discovered' in Botany Bay, Australia by Sir Joseph Banks, on Captain Cook's first voyage of discovery in 1770
- Surgeons on the First Fleet in 1788 used *E.piperita* for wound healing, based on organoleptic properties similar to English Peppermint
- Ferdinand von Mueller, Director of the Melbourne Botanic Gardens promoted its antiseptic use possibly based on Australian First Peoples' use
- E.globulus* Seeds originally sent to Europe for timber agronomy

First phase in the west: anti-malarial use

- The European *Eucalyptus* forests gained a reputation for clearing malarial districts of 'noxious odours' with their 'fragrant emanations'
- This use soon fell out of favour with developments in scientific knowledge of germ theory and the discovery of the mosquito vector
- It was realised that *Eucalyptus* drained marshy sites and interrupted the mosquito life-cycle

Figure 1: % Occurrence of Form, administration and indication within medical articles of the BMJ, TL & PJ 1823-1970

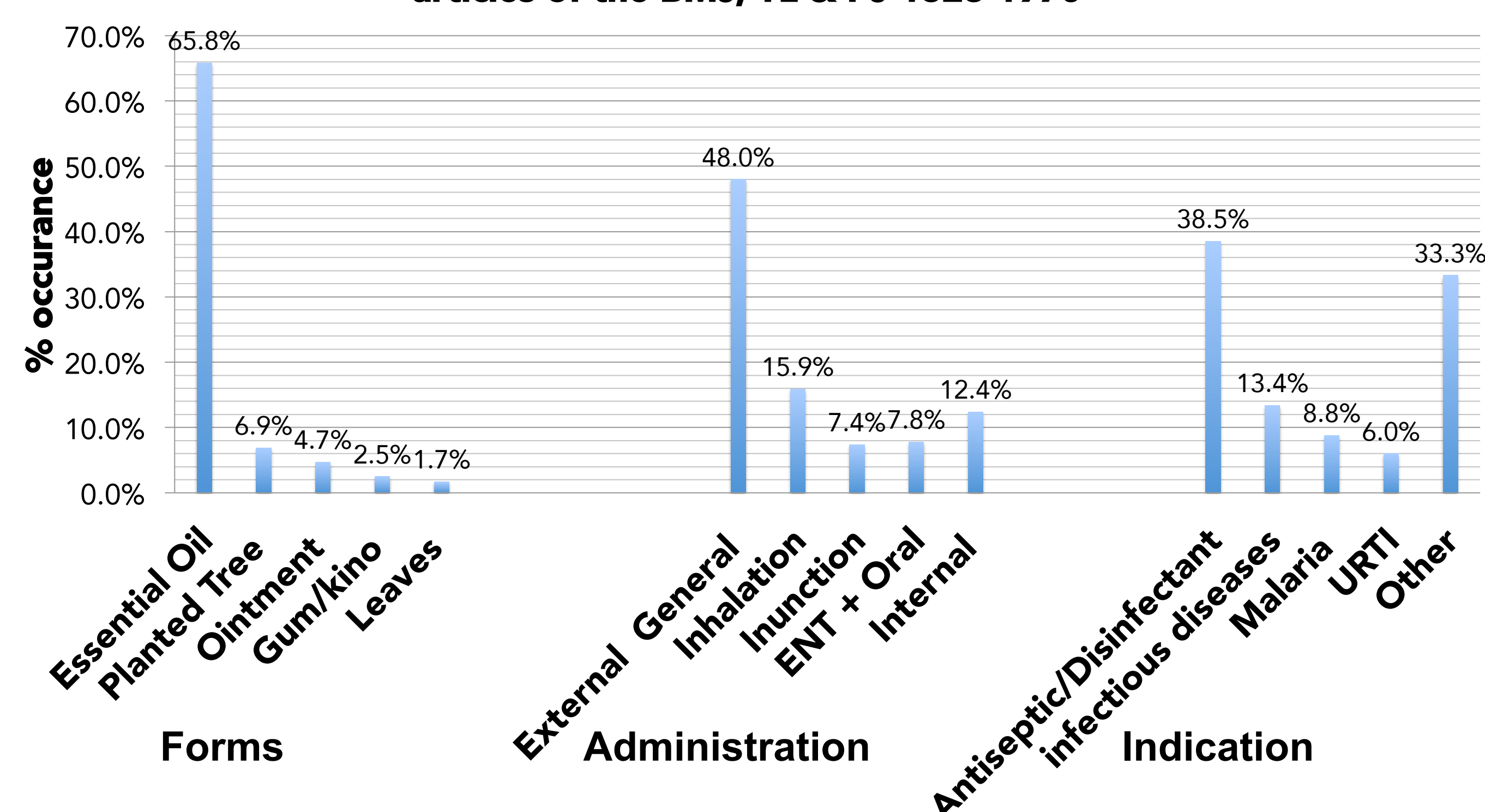
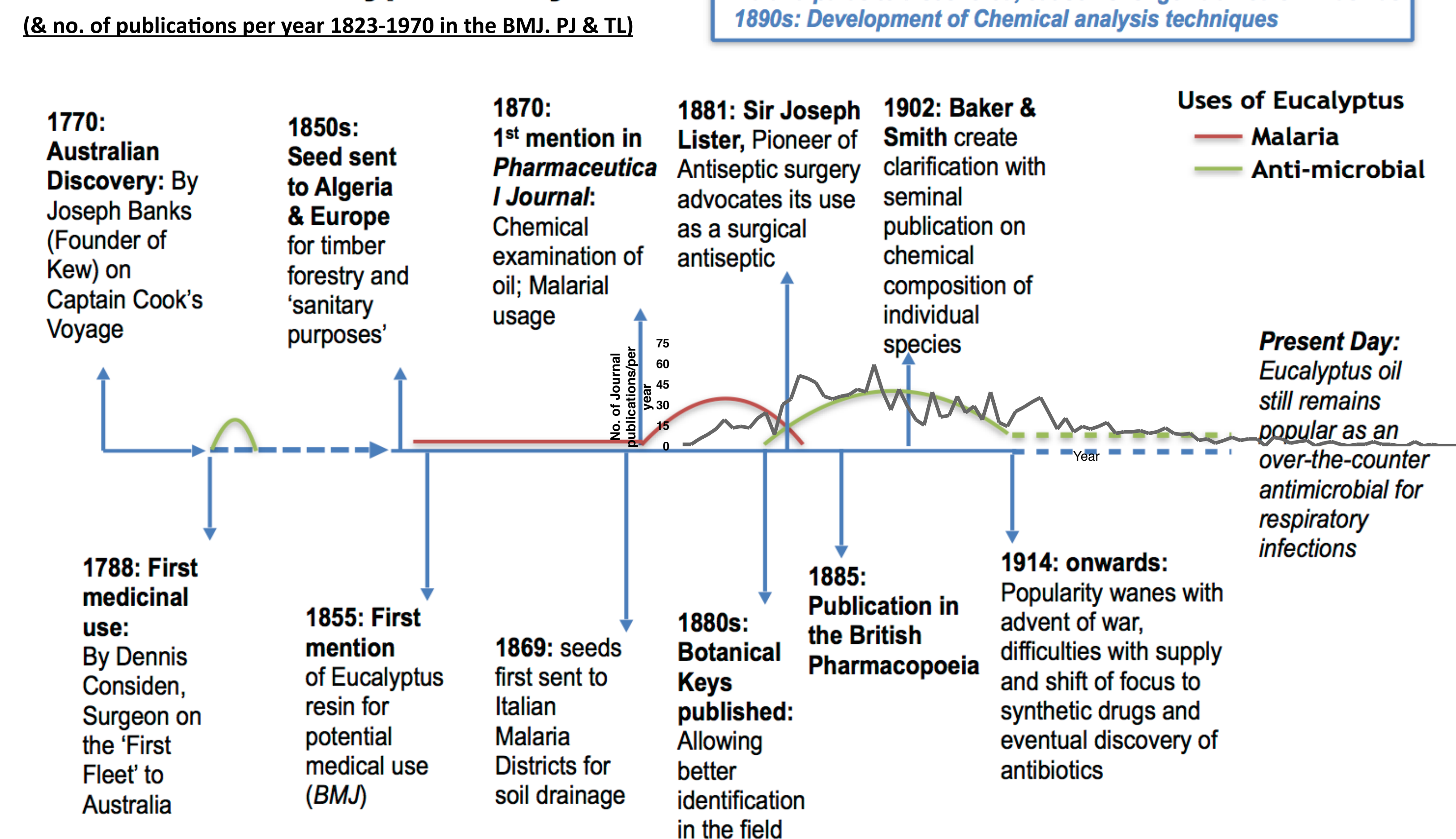


Figure 4: Timeline overview of significant events in the Eucalyptus story (& no. of publications per year 1823-1970 in the BMJ, PJ & TL)



Development as an antiseptic

- Sir Joseph Lister, pioneer of antiseptic surgery in 1881 advocated the use of the essential oil as a disinfectant and in wound dressings
- Publications on this use rose and were maintained for other antiseptic uses, including infectious diseases (See Fig.1) and as an inhalation for colds, 'flu and Tuberculosis

Problems

- Political and economical supply 'battles' between European-grown species and the wider variety of potentially more medicinal and higher oil yield species in Australia
- Arguments over the best species and key active constituent in early chemistry development
- Chemical tests confounded by un-authenticated oils contaminated with other species at the distilling stage (Fig.6)

Fall from use

- Supply interruption during the First World War prevented further investigation and widespread use
- Discovery of Antibiotics after World War 2 further impacted on use of plant based antimicrobials

Conclusion

The translation of this Australian botanical therapeutic into western medicine was not always a straightforward process. The official species settled on was not necessarily the most medicinal. There was a definite tension between quality and supply; in the end the most easily produced species dominated pharmacy. Because of this, the full potential of *Eucalyptus* may not have been explored. There may yet be some hidden value in the 'forgotten' (700+) species to modern day healthcare, particularly in the light of the need for novel antibiotics.^[5]



Figure 5: (L) *E.globulus* botanical drawing; Figure 6: (R) An essential oil distillery, Australia, circa 1850. Picture credits: Natural History Museum

References

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