
Preface

Rebecca Northern's *Home Orchid Growing* provided recreational reading when I was studying for my professional examination in London in 1968. I continue to enjoy reading about orchids and growing the plants. Noticing that orchids are now receiving attention as possible sources of medicinal compounds, I decided to study this area in depth because, having been privileged to participate in laboratory and clinical research for many years, I could employ my medical background to examine the extensive research that has been conducted on the use of orchids as medicine. There is maximum, continuous usage of orchids as medicine in Asia, for the longest period, and because Asia is my home, and also the area of much of my travel, the coverage of medicinal orchid species will be restricted to this region.

Before the advent of scientific medicine, all civilizations relied on plants and other natural materials to cope with pain, trauma and disease. Dominance and sex being important elements of Man's animal heritage, plants with alleged invigorating or aphrodisiac properties were eagerly sought after. Growth hormone, testosterone, sildenafil and tadalafil are only modern substitutes for much the same need.

Herbal medicine is practised worldwide, and not in Asia alone. In many continents, orchids have been used to nourish or to heal. *Salep* derived from terrestrial Mediterranean orchids and extracts of North American *Cypripediums* featured in European and American pharmacopoeia well into the later nineteenth century. Nevertheless, using orchids as medicine is most entrenched in China, which has a well-documented and the longest history of continuous usage, as well as the longest list of orchids in medicinal use. Worldwide, there are over 25,000 species in approximately 850 genera but only 2 % have a published medicinal usage. It is estimated that approximately 1200 species of orchids belonging to 174 genera occur in China. More than 250 species (or over 20 % of total species) in approximately 100 genera are already recorded in Chinese herbals as having medicinal usage. Four orchids are classical medicinal herbs whose origins can be traced to antiquity. They are still commonly employed in the Orient, from China to Korea, Japan and Southeast Asia, and by Chinese communities in far-flung countries. Chinese herbal soups occasionally contain an orchid.

Orchids also feature in Ayurvedic medicine. They constitute half of the eight items in the famed *Asthvargha* tonic. Nearly two dozen Indian medicinal names are attached to *Dendrobium plicatile*, many of which denote "life". It is one of two candidates that fulfil the description of a mysterious

Himalayan herb that restored life to the *Ramayana* hero, Lakshmana. Truckloads of this orchid are imported into India from neighbouring countries. Tribes in India and the surrounding countries employ orchids in various ways to treat trauma and disease.

Having experienced a shortage of medicines during World War II, after the war scientists embarked on an extensive search for alkaloids in plants. There was some difficulty in studying alkaloids in orchids because rarity or small plant size sometimes made it difficult to collect sufficient materials for the identification of chemical compounds. Nevertheless, this did not deter the Swedish team led by Bjorn Luning and Kurt Leander or the Australian team of Slaytor and Walker from undertaking alkaloid screening programmes. Together, by 1994 they had published the data on 1750 orchid species. Japanese, Chinese and Korean scientists were more interested in studying orchid species employed in traditional Chinese, Japanese and Korean medicine. There are extensive publications on phytochemicals from *Gastrodia elata*, *Dendrobium* spp. and *Bletilla striata*.

Forced to rely on its own resources to promote the health of its people when the “Bamboo Curtain” descended over the Peoples’ Republic of China, the country undertook an extensive in-depth study of ethno-medicine which hitherto had only been provincial or tribal knowledge. In the process, hundreds of orchid species were incorporated into an expanded *Ben Cao* (*Materia Medica*). By unveiling the reproductive biology and pharmacology of important medicinal species, scientists in Guizhou and Yunnan managed to promote the cultivation of such species on an industrial scale and to manufacture specific compounds to meet with demand.

As a consequence of the remarkable economic and scientific advances made by China during the last three decades, traditional Chinese medicine is witnessing an interphase between tradition and science, with science dominating the transition. Concurrently, there has been an explosion of publications, including many on orchids. Several traditional medicinal orchids have since been shown to contain compounds that exert a wide range of pharmacological effects. Some compounds are unique in their actions, some are capable of protecting brain cells, while a few act against malaria parasites or liver flukes. Orchid extracts may protect the skin or liver. There are compounds that kill cancer cells, while others reverse cancer cell resistance to chemotherapeutic agents. *Bletilla striata* starch is employed for embolization to treat inoperable liver cancer and is being developed to assist in the delivery of drugs. Such compounds are being actively studied to determine whether they can be turned into potent drugs.

There are many studies on ethno-medicine in India, but until the advent of the internet knowledge of the subject was mainly confined to the nation. In Calcutta, Majumder and his team of collaborators isolated a long list of compounds from numerous Himalayan orchids. Korean scientists have also investigated the pharmacology of their orchids. However, it is difficult to extract these data because they are either not available in the English language or they are published in journals which are not read by doctors,

nor by orchid enthusiasts with no interest in pharmacology. Research materials originating in China and Japan are mostly recorded in journals which employ their native languages and such data may remain unnoticed by Western readers for decades. I am fortunate to have been helped by medical colleagues who have mastered the Chinese language. They provided me with the necessary support that has enabled me to research the Chinese literature.

This volume thus sets out to compile a list of the medicinal orchids employed in Asia, briefly describe their identification, distribution, habitat and flowering season, how they are used and their pharmacology. Medicinal orchid species are described individually, grouped under genera. An overview sums up and discusses the research findings in each genus. Clinical information is occasionally included when it was necessary to explain the significance of the research data. Findings that hold promise of possible therapeutic application are highlighted.

The Introduction gives an overview of herbal medicine, its role, the extent of its usage and the risks involved. Since many Western readers may be unfamiliar with Asian medicinal tradition, the various traditions are described, followed by a discussion of the way herbs are collected and prepared. A brief survey of plant metabolites is intended as an introduction for the general reader to the types of bioactive chemical compounds isolated from orchids in which scientists are interested. Currently, the effects of medicinal orchid species are being proven by laboratory research on tissues or laboratory animals, but there is a paucity of data on human subjects. Nevertheless, this is a beginning. A placebo-controlled randomized clinical trial being the gold standard to prove efficacy of any new drug, a chapter is included to emphasize that it would be difficult, today, to endorse a herbal remedy without such experimental proof. A short final chapter explains the difference between anecdotal evidence and data which are statistically significant.

The use of orchids as aphrodisiacs in India, and the high Chinese demand for some medicinal orchids, worry conservationists who are concerned about the status of wild orchids in India (especially in the Himalayan region), China and continental Southeast Asia. Conservation, the preservation of biodiversity and problems in the enforcement are discussed in detail.

I wish to stress that this book was not written to endorse the use of orchids as medicinal herbs. I do not practise Chinese herbal medicine. Scientific research on medicinal orchids, although extensive and exciting, is still at an early stage, and it is inappropriate to draw clinical inferences or conclusions from *in vitro* studies and animal experiments. Much remains to be done to see that proper clinical trials are conducted to substantiate or disprove the claims for specific therapeutic uses of individual orchids or their compounds. I have kept an open mind on the subject, and I have tried to be impartial in my assessments of published articles. The claims that are made in the quoted publications are reported as they appear and no attempt was made to check their validity. On the issue of tribal and folk medicine, it seems unlikely that the authors actually witnessed the orchids they described being used to treat disease and the results, as ethnomedicinal botany is basically constituted from statements of folk practitioners. This being so, the portion of the present

book which deals with herbal usage should be viewed as just a historical record and not as recommendations for use.

Scientists recognize that, when dealing with herbal products, there is the problem of dosage standardisation. Pharmacological potency of biological products vary from batch to batch and the potency of a herb cannot be accurately determined by weight. Only highly purified, single compounds can be standardised by weight. Recommendations for the use of chromatographic analyses to be employed for quality control have been made, but this is not universally practised. Furthermore, since chromatograms of batches will certainly vary, every batch requires bioassay and that is hardly possible to put into practice. There is also the problem of the proper identification of species. The best way to handle this last problem is for medicinal orchids to be commercially cultivated. Clonal propagation might bring herbs closer to a uniform standard, albeit the environment will produce differences.

Readers will notice that a good percentage of the references are made up of material published in Chinese. For their translation, I wish to thank my colleagues and friends, Ong Siew Chey, MD (Chicago), FACS, and Wu Dong Yin, MD (Shanghai), who devoted a great deal of time to this effort. I am grateful to Wibowo Sutjahto, MD, who translated the Dutch texts for me, and especially to Joseph Arditti, who spent many days going over the text with me, for his advice on how botanical data should be presented and for access to his treasure house of references. The Library of the Singapore Botanic Gardens and the National Library of Singapore were valuable sources of reference materials, and I thank their staff for their kind assistance. I also wish to record my thanks to Hong Hai, PhD, for reading through my text and making valuable suggestions. For colour photographs, I am indebted to Bhaktar Bhadhar Raskoti for his numerous images of Himalayan orchids, the Plant Photo Bank of China and Luo Yibo, PhD, for photographs of Chinese orchids, as well as Henry Oakley, Peter O'Byrne, Nima Gyeltshen, Liu Ming, Hubert Kurzweil, Tim Yam, Sathish Kumar, Suranjan Fernando, Jagdeep Varma and Ang Wee Foong for additional photographs of medicinal orchids. I thank the Orchid Society of Southeast Asia for giving me the privilege to photograph orchid plants exhibited at their meetings and shows, and my many friends in Singapore, Thailand, India, Bhutan and China who helped to provide access to orchid species: in particular, Mak Chin On, John Elliott, Rapee Sagarik, Apichart Jitnuyanond, Michael Ooi, Robert Ang, Udai C. Pradhan and Ganesh Pradhan, Ngawang Gyeltshen, Nima Gyeltshen and Rajendra Yonzon.

To complement the short descriptions of the plants, black and white drawings are featured to illustrate the general appearance of the plants in various genera. These were originally planned to be line drawings borrowed from old, classic publications. As it turned out, it was not possible to provide a comprehensive coverage through this avenue. However, I did manage to borrow some excellent line drawings from Abraham and Vatsala's *Introduction to Orchids* and I wish to thank the Director of Jawaharlal Nehru Tropical Garden and the Botanical Research Institute, Parolde, for permission to reproduce the drawings. For the remaining black and white illustrations, I am grateful to the Plant Illustrations Organization and the Missouri Botanical

Gardens for access to their vast collection of old publications whose material is now in the public domain. I also wish to thank the other libraries for the materials which are reproduced with their named source.

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