COMFREY

NATURE'S HEALING HERB
&
HEALTH FOOD

ANDREW HUGHES

COMFREY

For 2000 Years
Nature's Healing Herb

Andrew Hughes

First printed in 1992
Printed in Japan

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7/7 Woodside Ave.
Ringwood, Vic. 3134
Australia

Distributed in Japan by Sanyusha Publishing Co., Ltd.

CONTENTS

Introduction

January 21, 1991

I am writing this on my eighty-ninth birthday, after taking some 85 grams or more of green leaf of Comfrey in tablet form every day for 28 years, a routine adopted by my wife and myself and followed strictly ever since we were married. Back in 1978 we were taking the equivalent of approx. 135 grams of green Comfrey leaf a day with no side effects. We reduced it to 85 grams as an appropriate average amount, considered diet- and cost-wise. In studying the history and virtues of Comfrey we came to the conclusion that it would serve to make up for deficiencies in the food available on the market, and in a variety of ways help to maintain good health in the life of intense work we were engaged in; wherever we travelled our Comfrey tablets always came with us. For specific reasons that will become clear, it is time now to put together the amount of material accumulated through these 33 years of my life and work in Japan. I introduced Comfrey to Japan in April 1958 and in 1965 wrote our first Comfrey book, "Miracle Grass, Comfrey," (published in Japanese) and it is what has happened since then that makes this record so necessary. Comfrey became a subject of dispute and an official ban, first in my home state of Victoria, because of the alkaloids contained in leaf and root, and as the subject of some controversy, with a lot of nonsense as well as a lot of horse sense talked about it in the intervening years; it is time to set the record straight.

One interesting fact is that one can buy Comfrey in various forms in other countries, especially in what are commonly called "Health Food Shops", but not in Australia. Of course people want to know why. So let us examine all aspects of this controversial subject, hoping that as a result of such an examination, we can get the ban lifted, enabling the benefits of the regular ingestion of Comfrey to be available to everyone who wants it, the right of everyone to choose his or her own life-style and way of ensuring good health. This can only be done by countering the alarmist nonsense put out by scientists who have failed to observe the first principles of science, and by making sure that the benefits of

Comfrey, the medical history of which goes back nearly 2000 years to the Greek physician, Dioscorides, are available to all who want, and in many cases, need them. In the first century of the Christian era Dioscorides wrote the first Materia Medica, with the first recorded mention of the place and role of Comfrey as a medical herb and how it was used, based on the empirical record of its healing powers.

Now is an appropriate time to use the words – "the search for natural health". We live at a time of gross disturbance, with environmental disruption of the world we live in, plus the overbearing dominance of high technology and the overpowering influence of the chemical and pharmaceutical industries. All benefits aside, this has resulted in the poisoning of the soil and seas with agricultural and industrial chemicals, the threat of global warming caused by industry and our advanced social conditions with our excessive use of energy, resulting in the loss of the protecting ozone layer, combined factors that lead us to ask, "How can I safeguard my health?"

When we consider the additives, colorings and preservatives used in prepared food we wonder what we can possibly eat that is safe. Add to this the growing habit of fast food snacks and sugary foods made to tempt the palate, a constant trap for the unwary, and especially for children, and we find ourselves in an atmosphere surrounded by temptations that would rob us of our healthy balance in living and eating.

It is this balance I want to talk about.

Understanding the Problems

To understand the problems now being faced from environmental pollution and the threat—no, more than a threat—the actual destruction of health and even life itself by the much-praised advances in technology, one should read the book "High Tech Holocaust" by Dr. James

Bellini, published in Australia in 1987 by Greenhouse Publications.* We tend to think unthinkingly, if that is not a contradiction in terms, that modern technology with all the accumulated benefits it has given us is a highly efficient development that adds to our comfort and the enjoyment of life.

But statistics given by the author provide a counter to such easy acceptance of the benefits of modern technology, and though few of us would be prepared to go back to the horse and buggy days and forego our enjoyment of the comforts and conveniences of modern life, choosing what some prefer to call the "Simple Life", the present growing menace to health will almost certainly force us soon to put very strict controls over factors governing our lives and public activities if we are to save ourselves from self-destruction. In alarming detail Bellini gives the record of pollution of the land by agricultural chemicals, with the consequent pollution of our food, the soil and seas.

Very clearly he explains that it is not only the actual products of the chemical and other industries that are poisoning people; it is the vast amount of waste produced in the process that is creating an almost unsolvable problem. All will realize at once that this is a major problem, for example, with the atomic energy industry, though we all are benefiting from the electrical power produced by atomic energy for domestic and industrial use. We don't need an accident like Chernobyl to make us realize that atomic power is a very dangerous addition to modern technology, and of course the existence of the accumulated store of nuclear weapons, which we know were used once in war 46 years ago, makes us realize the constant danger from this new technology.

This can and must be controlled by international agreement, but how to deal with and safely dispose of the accumulating waste from the nuclear and other industries is a problem that so far has not found a

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*High Tech Holocaust by James Bellini. Greenhouse Publications, 1987. Greenhouse Publications was taken over by Penguin, and the book is not available now. It should be available and be read.

satisfactory answer.

This has now become an almost common awareness. But only by studying the statistics given by Bellini can we realize the damage being done by the products of modern chemistry and the range of pollution from the accumulated and accumulating waste produced in the various processes. He takes up the world-wide issue of Acid Rain, a modern Hi-tech problem that threatens to destroy traditional farm lands and forests all over the world, reducing the potential of standard food crops and reducing the capacity of the soil to retain water, with increasing run-off and erosion; the record of the damage done by heavy metals, such as brain impairment from lead discharged into the air from many sources, including leaded petrol still being used in heavily motorized Australia; the tragedies caused by organic mercury, adding the new medical term "Minamata Disease" to our vocabulary from the deaths and permanent disabilities caused by the mercury discharged into the sea by a chemical company at Minamata, Japan, poisoning the fish and shell-fish that formed so much of the diet of the people of Minamata, with similar tragedies in New Mexico and elsewhere. Putting aside the record of pollution caused by smoking fires and factory chimneys belching out smoke and soot, particles of inefficiently consumed coal that made London the most smog laden city of the world, now at least somewhat improved, we need to look at these problems that come closer home to us all, problems we scarcely think about, but which we will have to face up to if we are to survive and enjoy good health.

One could worry oneself to despair or even death if one took account only of the odds against us. We still must eat if we are to live. And if we are to live fit and well, and maintain health to work and enjoy living, our first quest must be to ensure that the food we eat provides our total needs in balance. Here's the problem. As Dr. Kirshner asks, Are You What You Eat?,* and our problem is made more difficult because so much of the food obtainable is deficient in some of the essential elements.

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*Are You What You Eat? Dr. H.E. Kirschner. White Publication, Calif.

It is here that Comfrey comes in.

It is not a cure-all, but Comfrey will help to build up our defenses against all forms of infection and the effects of pollution of the air, water and food. It is a protective addition to help balance our needs and strengthen our resistance. The reasons will become clear as one reads the story unfolded in these pages. It goes from small caged birds, poultry, pigs, cows, horses, zoo animals and on to mankind. But it does not end there. It goes right back to nature's cycle of the soil. I will tell the story of Comfrey with an extract from a paper I wrote some 30 years ago because it forms somewhat the basis of the Comfrey story I relate.

Foreword

Comfrey today means the rediscovery of a very old friend of mankind. Mankind cannot find health and happiness far away from nature. Though many are condemned by circumstances to live in cities poisoned by foul air, contaminated food, car gases, fumes from factories, chemicals in food, agricultural poisons and what have you, we all feel the need for the life-giving balance of natural foods and pure air.

Mankind is a product of the soil. It is not theology that says "Dust thou art, to dust returnest"; nature itself says it. And in spite of all the marvels of modern science, fast cars and planes, rockets and moon trips, chemistry and synthetics, man is still part of the organic universe of living matter; out of the earth he came and must live by sustaining himself on what comes out of the earth. In this complex cycle of nature which Stanton Hicks calls, "Life from the Soil",* a relationship expressed in Japanese as "Agriculture and medicine are one body", Comfrey has a positive role to play, offering so much in the field of health.

Millions of people in the world are hungry, deficient in their basic need for proteins, carbohydrates, minerals and vitamins. Even those who get enough food often do not get the right kind or well balanced food, and deficiency diseases are common even among the otherwise well-fed. There are many reasons for this. And in a world going through a population explosion, this compound problem is one of major proportions that could wreck us before we go much further.

While modern medical science clears up some of our enemies such as yellow fever, malaria, cholera, small-pox, etc., civilization is bringing in to replace these ills the fashionable maladies of high blood pressure, gastric ulcers, cancer, heart-diseases, psychoses, neuroses and

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*_Life from the Soil_. White & Hicks, Longmans Green & Co., London.

plain tension—with psychosomatic effects that throw the whole body mechanism out of order. The result is a civilization of hypochondriac pill-takers, mankind trapped in a vicious circle.

In these circumstances Comfrey comes in as a food and medicine that can be grown in a domestic garden, a most abundant vegetable source of high quality protein, a daily source of nature's medicine and tonic, a healing herb. To the farmer who wants to produce more and better eggs, chicken meat, pork, milk, cheese, butter, beef, the whole range of high grade protein that includes fish and rabbits, Comfrey can be one of the richest sources of high grade food for stock, with a far-higher yield per acre than any other forage plant, not excluding the wonderful alfalfa.

It will grow where alfalfa will not grow, almost anywhere from cold snowy regions to semi-tropical climates, yielding from 60-140 tons of high grade green leaf per acre every year, and go on growing in the same place throughout one's working life, and one can reasonably expect a longer life if it is used regularly. Your Comfrey will outlive you and still be growing if you treat it properly.

There are myths and mysteries in this story of Comfrey. The purpose of this small book is to lay the facts on the line. We have collected our data from many sources, but we are not dealing with myths. We are relating facts. Our knowledge is expanding further now because of the work being done overseas and in Japan. We are proving the claims made elsewhere, testing, analyzing, experimenting, and confirming, and adding new knowledge from our own work.

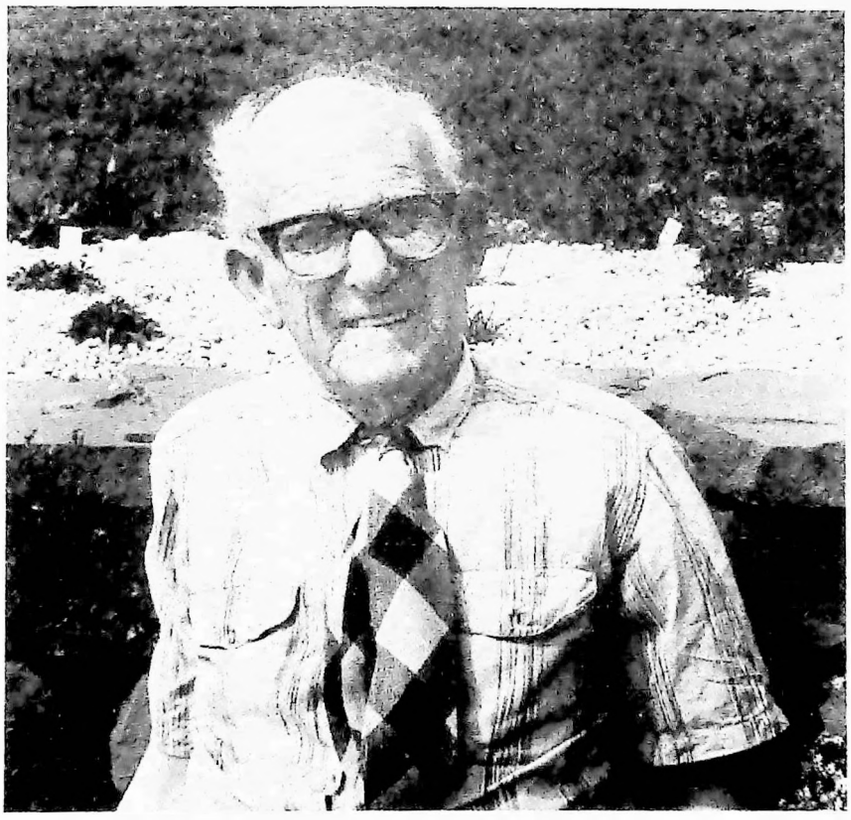
Acknowledgment

It would be quite inappropriate to set out the story of Comfrey here without due acknowledgment of the work of the Henry Doubleday Research Association, formerly of Essex, now at the National Centre for Organic Gardening, Ryton on Dunsmore, Coventry, England, and the sterling work of research and investigation done by its founder and

President, the late Lawrence D. Hills. The work of Henry Doubleday himself will be briefly told in the chapter dealing with the history of Comfrey. But even in the telling of this, we are dependent greatly on the work of the Association, which is a voluntary association of some thousands of people living in many countries, comprising gardeners, farmers, and research specialists, amateur and professional, who pool their knowledge and experience with the following purpose:

To advance Education and Science for the public benefit by

* the improvement of scientific and practical horticulture and agriculture in all their branches through the application of organic methods and principles.



Lawrence D. Hills
We pay full tribute to the man who built the H.D.R.A. to the largest Organic organization in Europe. *"To live in harmony with the Earth"*

* research into, and the study of, improved methods and principles of horticulture and agriculture and the dissemination of the useful results thereof.

* the advancement of awareness and knowledge of ecosystems and our impact on them by demonstrating the value of organic methods on a broad educational front, both in the United Kingdom and overseas.

Mr. Hills, who died on September 20, 1990, after a life-time devoted to this work, is the one on whose writing we are drawing extensively, the man with the greatest knowledge and widest experience on the subject of Comfrey. If at times we quote and fail to acknowledge the source, you can be reasonably sure that most of it comes from Mr. Hills. Among his voluminous writings, his major Comfrey book comes under the simple title "Comfrey, Past, Present and Future", published by Faber and Faber in 1976. He generously gave us the use of some of the typed chapters of his book long before it was published, in addition to many other writings which have been our constant guide.

On behalf of the author, and the many Japanese farmers and other users who are reaping the benefit of his work, we record here our sincere appreciation. The work we have done in Japan is a tribute to his work, and we warmly acknowledge our indebtedness to Lawrence Hills and the Henry Doubleday Research Association which he founded.

January 1991

The work we have been able to do in relation to Comfrey in Japan has only been possible because of cooperation in every detail, translating and interpreting, and with full understanding of the subject typing this manuscript, the work of my wife, Tomoko (Matsuda) Hughes through these more than 30 years.

Tomoko & Andrew Hughes, May, 1989

Stimulating & Enlightening Reading

Books relating to our main subject—Natural Health. We don't have to agree with all they say, nor do they all see eye to eye. But they can help us find the basis of informed and intelligent understanding of the subject of diet and health – eating right to keep well, fit and active.

Dr. Franklin Bicknell, *Chemicals in Food & Farm Produce,* Faber & Faber, 1960.

Robert van den Bosch, *The Pesticide Conspiracy*, Doubleday, 1978.

Dr. J.L. Mount, *The Food and Health of Western Man*, Precision Press, 1979.

Dr. Roger J. Williams, *Nutrition Against Disease*, Bantam, 1980.

Dr. R.C. Atkins, *Nutrition Breakthrough*, Pericord Press, 1981.

Dr. James Bellini, *High Tech Holocaust*, Greenhouse Publications, 1987.

Adele Davis, *Let's Eat Right and Keep Fit*, Harcourt Brace Jovanovich, 1970.

Margaret Kreig, *Green Medicine–The Search for plants that heal*, Rand McNally, 1966.

Ivan Illich, *Medical Nemesis*, Pantheon, 1976.

Dr. Lendon H. Smith, *Improving Your Child's Behavior Chemistry*, Simon & Schuster, 1976.

Dr. Tim Lang & Dr. Chas. Clutterbuck, *P. is for Pesticides,* Ebury Press, London, 1991.

Lawrence D. Hills, *Comfrey – Past, Present and Future*, Faber and Faber, London, 1976.
(The most detailed and authoritative book on Comfrey)

C.J. MacAlister, *COMFREY – An Ancient Medical Remedy*, Bale & Danielson, London, 1936. Reprinted 1975 HDRA

White & Hicks, *Life from the Soil*, Longmans, 1953.

Bromfield, *Out of the Earth*, Cassell & Co., 1950.

McCarrison Society, *Nutrition and Health*, Faber & Faber, 1982.

HDRA, *The Safety of Comfrey*

Part I

COMFREY in JAPAN

Russian Comfrey No. 4

Comfrey Comes to Japan
The Story in Brief

The coming of Comfrey to Japan begins in Australia on the dairy farm of William Foster Savage. Mr. Savage was not necessarily the first Comfrey grower in Australia but was certainly the first farmer there to put Comfrey to practical commercial use as a stockfood, which he did on his own dairy farm at Red Hill South, Victoria.

One interesting part of the story of this first crop of Comfrey in Australia is that the Victoria Department of Agriculture did its best to destroy the crop, claiming that it could become a noxious weed related to what is known as Patterson's Curse, a real pest in certain parts of south-eastern Victoria. The Department sent men down to Savage's place to burn out his young crop. They didn't know that there was more of it down in the valley, and by the time they came to understand that Comfrey was not likely to become a pest but indeed was a valuable stockfood, Savage was successfully using it for his stock and even as a health food for his own children. I don't know whether Comfrey's vital power is one reason for his large family of 13 children but that Comfrey did help the health of his children is an undeniable fact.

When I visited his farm in 1955 I learned that they had cured the baby's upset stomach with Comfrey juice added to the baby's milk. My companion on the visit to his farm was an Indian agriculturalist then at Melbourne University on a Colombo Plan grant, and we both decided that the plant was worthy of thorough testing. I may add that this Indian friend is a producer now in India of a wide range of medical herbs, including Rauwolfia, which plays such a valuable part in modern materia medica.

I obtained my first Comfrey roots from Foster Savage and began its cultivation on my farm in 1956. When I came to Japan in 1957, half intending to go on to India again (where I had previously worked in education for 7 years) having sold my farm, I brought with me only the knowledge of Comfrey that I had gained from Foster Savage. This was

also my introduction to the Henry Doubleday Research Association, then of Essex, England, of which I became a member.

DOI Naoto. The first Comfrey grower in Japan. Plantation established at Kumagaya, Fukaya City, Saitama. *"With courage to venture"*

Almost by chance, though not entirely, I came to Japan. Almost by chance too, I met a Japanese farmer by the name of Naoto Doi within two months of my arrival in Japan, and as farmers do, we were soon talking farm stock and food. I mentioned Comfrey, and his ears pricked up when he learned something about the potential of this "miracle plant" as it was quickly labeled here, and I agreed to try to get some roots into Japan for testing. With the co-operation of the Japanese Department of Agriculture (Farm-grown stockfood section) and the agricultural section of the Ministry of International Trade and Industry, I got permission to import 50 offsets (root-sections) of what went by the commercial name of Webster's Giant, from William Foster Savage at Red Hill South.

We planted those 50 offsets on the 25th of April 1958, and according to my carefully kept record of the experiment, ten weeks later, on

June 29, we cut an average of about 2 kg of leaf from those original plants, and fed the leaves to the small dairy herd on this farm in Saitama Prefecture, about 30 miles north of Tokyo.

The far-seeing decision of this Japanese farmer, Naoto Doi, to try this new stockfood was the beginning of our great adventure with Comfrey in Japan. In the autumn of that year, after carefully selecting the best and most uniform plants, we planted out 1800 offsets, which got a good autumn start, and in the next spring jumped into a wonderful record of production. I found later, when I came to know more about the various clones, that we had propagated only clone No. 4, almost, if not wholly.

It was interesting to find that of the cows on which we tested the palatability of the Comfrey, all but one eagerly took this new food at once, even greedily. They were well-bred and well-fed Friesians (Holsteins) and good milk producers. One cow, at first doubtful about the new food, took to it semi-wilted, within a day or two. In a test done at Nihon University some years later, a theory was advanced that the reason why some cows are slow to take to Comfrey is probably due to a deficiency of a suitable type of bacteria in the rumen, but we have no scientific confirmation of this.

It was during the next two experimental years that we learned of the extreme susceptibility of Comfrey to nematode infestation in Japan. The two culprits are hetorodera and meloidogyne. On departmental investigation and advice, we used one or other of the two available chemical substances produced by two of the petro-chemical companies for injection into the soil; but this was found to be only a temporary measure, for, like the legendary cast-out devils, which can never be completely eliminated, devils or nematodes, they came back worse than ever within two years.

In later experience, when we developed our own test plantation, and began growing pedigreed Nos. 4 and 14 clones separately, which we got from that veteran of Ag. Science and Comfrey grower of England, Mrs. P.B. Greer, we struck the same trouble. We began our own experiment in 1967, and without resort to any chemical means, it took up to 4 years to get a clean crop by completely organic treatment of the

soil. This problems of nematodes in Japan is due in large part to the over-chemicalization of agriculture, especially in the rice paddies. But we have confirmed over the subsequent years of experience with our own plantation, that properly used organic methods do reduce the nematode problem to an almost negligible factor.

When I was in Israel in 1960 I found that the Department of Agriculture there, with whom I discussed Comfrey and other matters, had actually imported Comfrey roots from Kenya, but they had found nematodes in them and therefore they had had them destroyed; so Comfrey was never cultivated there for fear of introducing such nematodes, the soil being free of that particular kind. Among other things, I was recommending Comfrey among other uses as an ideal food for their extensive fish farming.

The story of the expansion of Comfrey in Japan builds up rapidly from 1960. Having tested the plants for two years, in spite of the nematode problem the time had come to tell the story for the benefit of Japanese agriculture. Japan was going through a partial agricultural and diet revolution, moving away somewhat from rice-oriented agriculture to the production of beef cattle, poultry and pork, and the farm self-supply stockfood division of the Department of Agriculture took a very special interest in what we were doing. I was interviewed by an agricultural monthly journal and the great daily, Yomiuri Shimbun, which broadcast through the press the story we had to tell, including our two years of growing and testing. The Department of Agriculture sent to Australia a man to whom I gave an introduction to Mr. Savage and others. Yomiuri, in addition to its newspaper and publishing services and its popular Yomiuri Giants baseball team, has a vast park-playground-golf-course area called Yomiuri Land on the borders of Tokyo, where they began the cultivation of Comfrey, and in the subsequent two years they gave away as many as 1,000,000 to 1,500,000 Comfrey offsets to schools, agricultural cooperatives and private people who wanted to test and grow the plant. I went out and showed them how to select and rogue the plants. These were boom years.

It was at about that same time that Comfrey moved into the medical and health food field in Japan. My wife and I found ourselves called

on to speak at many meetings, telling the story of Comfrey, its history, contribution to human health, methods of cultivation, propagation and use, etc. In all this we were dependent on the work of the Henry Doubleday Research Association and were favored by having a copy of the manuscript of part of Lawrence Hills' book on Comfrey, sent out to be a guide to us in the Comfrey story, a debt we gratefully acknowledge in our Foreword.

We found it necessary to get supplies of offsets to meet the urgent demand, and imported altogether 30,000 more from Britain, Australia and New Zealand. We carefully taught how to select and rogue a field of Comfrey and were successful in setting up two major plantations each of about 10,000 Comfrey plants, teaching the local farmers how to plant, cultivate, etc.

Disappointment and success

Published in 1983 in the biography of Tsutsumi Katsuhiko
A Tribute to the Work of Tsutsumi Sensei

The story of the introduction and expansion of the use of the medical herb, Comfrey, Symphytum Peregrinum, in Japan would be very incomplete without the record of the part played by TSUTSUMI Katsuhiko, who established the Tsutsumi Juku (Special School) at Nara.

I imported the first roots (50 offsets) of this unique plant from my homeland, Australia, from the farm of W. Foster Savage of Red Hill South, in my home state of Victoria, and planted them on the farm of DOI Naoto, at Kumagaya, Fukaya City, Saitama Pref., on 25 April, 1958. This was the beginning of two years of experiments in growing and using the leaves as stockfood for Mr. Doi's cows. This was the primary purpose of bringing Comfrey to Japan.

It was some two years later, with more study of the 2,000 year history of Comfrey which began in Greece with the recorded work of one of the world's first herbalists, Dioscorides, whose name is found in association with many plants in the botanical histories of the world,

that we began the use of Comfrey as a health food and medicine. This is where the work of Tsutsumi Sensei comes into the story of Comfrey in Japan.

TSUTSUMI Katsuhiko. On 10th anniversary of Kendo School.

Comfrey is a very honest plant. By this I mean that to grow it properly one must work very strictly in accord with the laws of nature; it will do well only with organic fertilizer. It can't be forced. I once saw young plants growing in a manure heap, with beautiful big leaves of excellent color. But in 3 months the plants were dead. Comfrey roots need to be able to get down to the subsoil to get the minerals they need. The hot manure heap inhibited their natural growth.

Then, in the leaf drying process, great care must be taken to dry at low temperature (not more than 50°C) so as not to change the protein structure, and not to lose the volatile elements so necessary in a health and medicinal food, allantoic acid in particular.

It was in these respects that the knowledge and training of Tsutsumi Sensei as a chemist made his work with Comfrey possible. When he decided to set up a drying and processing plant and begin preparation

for Comfrey leaf tablets to be made by a commercial tablet maker for human health food and for medicine, we realized that he knew how to go about it. And most important, what he did was as honest and trustworthy as Comfrey itself.

We had had some unfortunate experiences with some tricky people who thought they could take Comfrey and quickly turn it into money or use it to elevate their own prestige. In our disappointment we sometimes felt like giving up our work on Comfrey. But Tsutsumi Sensei restored our confidence because of the value and integrity of his work. I feel sure that his remarkable work in the education of disabled boys was also the basis of the work he did with Comfrey, because the same level of sincerity and honesty must go into both fields of work.

We imported roots (offsets) of Comfrey from England and New Zealand for the plantation he set up at Nara and another plantation set up by a colleague in Nagano Pref., who cooperated with Tsutsumi Sensei in producing and supplying first quality Comfrey leaf. The work proceeded successfully under the strict guidance of Tsutsumi Sensei, and we can say that of all the Comfrey powder and tablets we have seen elsewhere: In Canada, in the USA (ranging from Washington State to California) and in Japan, the tablets prepared by Tsutsumi are without question the best. He did not try to commercialize his work with Comfrey in the usual sense of a businessman just trying to make money with it.

His work continued in the same sincere way in which he first took it up. We have been able to send small lots of Comfrey tablets to some special friends in the USA and in Australia, people who do not depend on commercialized medicines, but prefer nature's natural way to health, helped by the daily use of Comfrey. We ourselves belong in this same category, and have taken Tsutsumi Sensei's Comfrey tablets every day from the very beginning of his work.

It is not possible to speak too highly of the work that stands to his credit in preparing and promoting Comfrey as a natural health food. We pay this tribute to his memory, and are confident that the work he began will continue as it began with the same high standard set from the beginning. The work is being carried on by his family with the

same devotion, integrity and reliability.

1st Sept., 1983

In spite of the disappointments with some of those who tried get-rich-quick methods of exploitation and some who proved to be unreliable colleagues, Comfrey soon came to be well-established in Japan. It was in this period of rapid expansion, 1961-1965 that the basis of Comfrey Report No.3 (July 1964) and much of No. 4 (Aug. 1966) (both published by HDRA for world-wide distribution to members) was laid, and the spread of Comfrey and its uses was one result.

When travelling throughout the country by car or train we often see crops of Comfrey on small Japanese farms, the characteristic form of agriculture in the country. Even in roadside gardens of private homes we see Comfrey plants. We don't know how they got there, but there they are, a spread which extends from southern Kyushu to northern Hokkaido, a distance of some 3,000 km, and on down to the island of Okinawa.

Probably no country except China is more devoted than Japan to the use of herbs for food and medicine. The move toward meat consumption in this modern age of industrialization only emphasizes the ambivalence of the people and their ways of life. But already the reaction against the too-great departure from the older and wiser ways is becoming evident, and devotion to vegetables, organic methods of cultivation, and a diet that is more natural and balanced, is reviving. There is little doubt that it is this essentially oriental approach to life that lies behind the rapid and widespread use of Comfrey. It peaked, quietened, and now is ready for a new stage of expansion and application. I think I could claim, without hope of proving it of course, that taken population wise, more Comfrey is now grown and used in Japan than in any other country.

The press so often carried reports that many foreign embassies sought our advice, and Comfrey has gone abroad from Japan, even back officially to the Soviet Union from whence it came through Henry Doubleday so long ago. Twenty seven countries came onto our mailing

list of contacts during the past 18 years, and Comfrey offsets have been sent to at least 16 countries from Japan. Brazil got Comfrey from Japan and Japanese farmers returning from Brazil sought us out for further information. Japanese farmers in Hawaii got Comfrey roots from Japan, and some came to see us when visiting relatives in their homeland.

We have never developed this as a commercial operation, though we did try to get started in the business with some friends at one time, at considerable financial loss. But what we did in those days was of great benefit to the promotion of Comfrey. So we have given time, effort and a considerable sum of money to the promotion of Comfrey both as stockfood and health herb, and have written reams of material, depending much on the work of Lawrence Hills and the HDRA, to which we have added much understanding gained from our own experience and accumulated knowledge. We published our first book on Comfrey in Japanese in 1965. Much has since been written by Japanese, but little of this seems to touch the fundamentals.

The following two reports appeared in the major Japanese daily, Yomiuri Shimbun, on Nov. 16 and 18, 1968. They contain some valuable information of wide interest.

"Expanding Comfrey"
From Tempura to Processed Food

YOMIURI SHIMBUN
Nov. 16, 1968

Comfrey, called "Miracle Grass", is being extensively used not only for stockfood, but also for human food and medical purposes. A tasting party to try "Comfrey fed meat", pork and chicken from animals raised on Comfrey was held on the Nov. 15 from 6 p.m. at Tokyo Prince Hotel. It was sponsored by Yomiuri Shimbun (one of the big 3 Japanese dailies, each with a circulation of upwards of 5 million). [It was Yomiuri that distributed 1 million (1966) and 1 and a quarter million (1967) Comfrey offsets to rural schools, villages, farmers, and agricultural stations.]

Yomiuri Land Comfrey Nursery Bed. 518,161 plants.

The party was attended by 170 people, including members of both Upper and Lower Houses, Mrs. Hiroko Sato, wife of Prime Minister Sato, clad in Kimono, Mrs. Yoko Kimura, wife of Mr. Kimura, the Secretary General of the Diet, and people concerned with the Ministry of Agriculture & Forestry, and Mr. Yosaji Kobayashi, Vice-President of Yomiuri Shimbun.

The meat of pig and chicken fed on Comfrey has a high nutritional value, but is lean with a delicate flavor. In addition to "Comfrey meat" cooked by the chef, Mr. Takeo Kisawa, of the hotel, there are more than 20 kinds of dishes using Comfrey such as Comfrey Tempura (deep fried leaf), Comfrey Oden (special Japanese style, Comfrey rolls like cabbage rolls cooked in special water-based mixture with sake [rice wine] and soy sauce), Ramen (Noodles), etc. and were found very

stimulating to everyone's appetite.

YOMIURI SHIMBUN
Nov. 18, 1968

A tasting party of pork and chicken fed on Comfrey was held at Tokyo Prince Hotel and greatly appreciated by those who attended. Flesh so produced is firm and better quality, with better flavor than other meat.

Fifty percent of green leaf Comfrey was fed to pigs, and broilers were fed 50% of their total food needs on dried leaf mixed in their feed. The Ishii Animal Husbandry Research Institute at Oohito Machi, Shizuoka Pref. took up this raising method, and they report that stockfood costs are reduced nearly to one third. Compared with other stockfood, labor is saved in cultivation management. A feeding test was also done at the farm of Agricultural-Animal Care Section of Nihon University, changing over to Comfrey in the food concentrate. It showed a saving of ¥3,000 (Stg.L=3.15.0) per head of pig. If Comfrey is used widely as a farm-raised stockfood, cheap and delicious "Comfrey Meat" can be produced.

Comfrey is also expanding greatly on the table as a nutritious vegetable. Green leaf quickly deep-fried in batter (Tempura), mashed green leaf in a mortar and pestle and mixed with sesame seed, or peanuts or mayonnaise. In addition, Comfrey can be used as Ohitashi (boiled young Comfrey leaf with soy sauce and bonito flakes), Pickles (One night pickle, done with salt) and in Sukiyaki.

As Comfrey contains high protein, a range of Vitamins and minerals, it has a wide range of uses as a processed food. Soba (noodles) in which is mixed 2— 5% dried Comfrey leaf powder, bread, Karinto (sweet cookie), Candy, Kamaboko (fish meal loaf), Chikuwa (fish meal roll) as well as Natto (Fermented Soya Bean), Batter of Tempura, Pudding and Hotcakes. These will help reinforce the nutritional value of home cooking.

Dr. Tadayoshi Fukuzumi, professor of Kitazato University says, "It

is ideal for man to take balanced nutrients and vitamins through food. For protection against adult diseases, the most important thing after all is to take balanced food, and I want to see Comfrey used in this way."

Soil, Food and Life

This is the title of a lecture given by Sir C. Stanton Hicks, famous nutritionist and professor of Human Physiology and Pharmacology of the University of Adelaide, Australia. The lecture was given at Melbourne University during World War II and widely circulated, but like so many very important statements, politely ignored by those who needed it most. I read the lecture about the time when I started practical farming and before I was introduced to Comfrey. I suppose it meant more to me than to most people because it brought so much new light and understanding to certain problems in my own thinking and experimenting. But even more vividly than that, it brought back to me memories of earlier experiences, the very beginning of my interest in this subject, the title of his lecture.

I want to draw now on certain parts of the lecture which are relevant to the subject of Comfrey, its method of cultivation and its relation to health.

The theme of the lecture is the cycle of flow of material through plant and animal from the soil, and back to the soil again. The energy for this flow is from the sun, and the living cells of plants and animals, both great and microscopic are only temporary embodiments through which this flow goes on. Every step in the process depends on the preceding one.

Prof. Hicks emphasizes two significant lines of investigation of this process that deserve deeper research, and which indicate the need for much further study of nutrition itself. He indicated that nutrition covers a wide range of subjects such as digestion, intermediate metabolism, accessory food factors, deficiency diseases, social medicine, infant feeding chemistry, the biochemistry of foods and other factors. He

refers to two great researchers who did much of their major work in India. It was there that I first came across their work, and had the privilege of meeting one of these two great contributors to human welfare. I refer to Sir Robert McCarrison* and Sir Albert Howard.

In 1930 I listened to Dr. Robert McCarrison at the Nutrition Research Laboratories in Coonoor and saw the remarkable work he was doing on food research, his colonies of rats, some with malnutritional diseases caused by diet deficiencies, and cured by correction of their diet. We saw rats that for four generations had had no illnesses or infant mortality and were resistant to disease because they had been correctly fed, though all around them were rats with skin diseases, bladder stones, low fertility rate, etc. Our visit as a group was arranged by Dr. G. H. Oldfield, a missionary from Australia who was establishing a hospital at Dhond, in what is now Maharashtra. I was concerned with the many mal-nutritional diseases of boys under my care at Baramati in the Poona (now Pune) district and we went to the Institute to try to understand the work McCarrison was doing, and learn to apply the principles in our own work.

Dr. McCarrison was at that time advising Mahatma Gandhi on matters of diet, for the Mahatma was then frequently fasting, and had cultivated the principle of eating only the essential minimum required for the maintenance of health and continued work.

McCarrison was engaged in a comparative study of the different diets of the Indian people in the various provinces, the guide to the nutritional disorders of each region; his brief and precise study of nutritional needs, which had been published under the simple title of "Food", became the vade mecum for diet guidance in my work as well as for my own family.

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* The work of Dr. Robert McCarrison was recognized by the British Government by granting him a knighthood; more importantly, a society was formed to perpetuate his work. The McCarrison Society in 1982 published a new edition of a book under the title, Nutrition and Health, containing three of McCarrison's most famous lectures, first published in 1944, with additional recent supplementary material by Professor Hugh Sinclair, Director of the International Institute of Human Nutrition.

I never met Sir Albert Howard, but I studied his "Indore Method" (the name comes from what was then an Indian state) and began working on his principles when I did some experimental growing back in Australia in the years 1939-1946, and later on my own farm in 1947-1957.

Let me quote Dr. Hicks.

Diet and Health

"In his Cantor Lectures for 1936, McCarrison described the results of a lifetime of study during his service in India. It began when he was medical officer to the Gilgit Agency and terminated when, after becoming Chief of the Indian Medical Service, he took charge of the Nutrition Research Laboratories which he had founded at Coonoor. Even during his days at Gilgit when he began to search for the cause of endemic goitre, he was struck by the good health, physique, vigor, cheerfulness and longevity of the Hunza tribe which lived within the confines of an Himalayan valley of that name. He was the more impressed because of the contrast they offered in respect of health and stamina with many other of the countless tribes that inhabit the subcontinent. The Hunzas are an ancient people whose agricultural technique was learned when the Britons were still adorning themselves with woad. It depends upon irrigation of a laboriously terraced valley, through the medium of an aqueduct cut in the solid wall of the precipice in which the valley terminates.

The agricultural system is therefore ancient. Wheat, vegetables and fruit are grown, and animal husbandry is practiced. The wheat forms the basis for coarse unleavened bread, the vegetables are lightly cooked in a little water, and meat is eaten as a luxury, the animals being reared mainly for their dairy produce. All refuse, plant, animal and human, is returned to the soil, so that a closed cycle of nutrition is maintained.

The difference between the diet of the Hunza and of southern Indians like the people of Madras attracted the attention of McCarrison, who found that the latter lived mainly on rice, parboiled or milled and polished, and then washed in many changes of water before preparation. Little milk or milk product was consumed, and vegetables and fruit only sparingly.

To test the effect of these two types of diets under controlled conditions, McCarrison used his large rat colony at the Coonoor Institute. Rats, like man, are omnivorous and their life cycle being short, the influence of the diets could be studied over several generations. The result was a perfect animal reproduction of the human picture. Rats fed upon the Hunza food were like the Hunza both in freedom from disease and in physical development, whilst the animals fed upon Madrassi food were stunted in growth and showed a high incidence of pathological disturbance, particularly of the digestive tract."

Soil and Health

The work of the Sir Albert Howard, on the other hand, was primarily concerned with diseases of plants, and began at the Pusa Institute of Agricultural Research in India, where, as a result of practically 25 years of investigation, he concluded that the health of plants and their resistance to disease and parasites depended on the nutrition of the plants, which in turn depended on the maintenance of soil fertility, and that the full possibilities of the new plant types which he evolved could only be fully realized in soils provided with an adequate supply of humus. If a new crop variety was evolved, which for example gave a 10% increase in yield, it was found that the use of humus might readily increase the yield to 100%. This was due to the fact that the new varieties were more efficient transformers of solar energy and that the consequent increase in the rate of flow of nutrients from the soil could not be maintained unless the fertility of the soil (not the productivity in terms of the use of inorganic fertilizer) was improved by building up humus.

The Uniqueness of Comfrey

There are two elements in Comfrey that confirm its uniqueness and explain the centuries-old history of its healing power: Vitamin B12 and Allantoin. We need to understand the source and function of these two elements in order to evaluate the role of Comfrey as a health-food supplement.

In his book "Out of the Earth", Louis Bromfield, famed for his Malabar Farm, takes us back to nature as the source of health. He says, "At Malabar we have always sought, both in the field of soils and in the health of plants, animals and people, to find out how best to work with Nature, in the profound belief that Nature was on the whole benevolent and could give us the answers in the fields of health as well as economic prosperity". (p.86) In the same chapter, "The Chicken-Litter Story", he relates their investigation into Vitamin B12, which I will later quote at some length.

But first let us look at Vitamin B12 in Comfrey. That Comfrey gets its Vitamin B12 from the soil and stores it in leaf and root was established by HDRA with research done by the then Chairman, Dr. F. Newman Turner, who after careful preparation of the experiment, showed under the microscope the red crystals of B12 in leaf and stem, and especially in the hairs along both.

Vitamin B12

Comfrey is the only land plant known to extract Vitamin B12 from the soil, where it is produced by bacterial action. Three kinds of seaweed make it, and also certain lichens, but little is known about how this essential element in human and animal diet is made and extracted.

Traces of Vitamin B12 were found on the leaves of certain plants, but this was due to bacterial contact from manuring, especially with sewage. This happened with turnips in the U.S.A., a case that created great interest at the time, at first wrongly thought to be in the leaf.

Comfrey leaf flour and Comfrey root flour were both found to contain Vitamin B12. In August 1960, four different types of Comfrey showed Vitamin B12 in the following quantities.

Millimicrograms per gram of dry leaf

1. 4.9
2. 11.6 (This is the variety of Comfrey imported into Japan)
3. 4.4
4. 5.0

Even at the lowest count (4.4) this provides enough Vitamin B12 in 2 or 3 tablets of compressed Comfrey leaf per week for fur animals such as Chinchillas, which suffer a vitamin deficiency in the winter. This B12 was also shown to be more effective than B12 produced by bacterial action on streptomycin waste, the usual source of the B12 injections for humans. It is injected rather than taken orally because it is less digestible than B12 in calf-liver. The evidence is that the B12 of Comfrey is more assimilable and suitable that the fungus-grown B12.

Eggs from hens on free range contain plenty of Vitamin B12. Hens on deep litter also get B12, but less, and eggs from birds in batteries (caged birds) are seriously deficient, even when it is added to their feed. B12 varies in meat. The variation depends somewhat on the soil manuring system, B12 being plentiful with organic manure, but deficient with artificial fertilizers.

Comfrey Dried Leaf Analysis

Our Comfrey leaf analysis set out below comes from New Zealand; the figures will vary according to soil treatment, time of cutting and season, but this is a standard average analysis and can be depended on.

My quotation from Louis Bromfield's "Out of the Earth" is from pp.91, 92 (First Australian edition, 1950.)

"Investigation showed that in old chicken litter, provided it is not actually wet, a great variety of fungi and moulds developed. It was then discovered that these fungi and moulds in the old litter produced a kind of high protein feed, by the same general process which makes it possible to produce the equivalent of beefsteak out of brewer's waste or high proteins out of sawdust, as the Swedes and Germans did during the war. This was named the 'protein factor' and actually provided the hens with a high protein feed that satisfied the protein hunger which had caused hens to attack and peck each other, even to death. Moreover, the fungi and moulds were also producing anti-biotics of the miraculous family of streptomycin, penicillin, etc., which in turn attacked and destroyed disease germs. Finally it was discovered that the principal element in the 'protein factor' was a new vitamin called B12,

at Russian Comfrey, probably No. 4 !

Standard Analysis (%)		Mineral Analysis (%)	
Moisture	13.42	Iron	.016
Fat	2.22	Manganese	.0072
Protein	22.30	Calcium (calculated as	
Carbohydrates (by diff.)	37.62	calcium oxide)	1.7
Crude Fibre	9.38	Phosphorus (calculated	
Ash	15.06	as Phos. Anhydride)	0.72

Vitamins, etc.

Thiamine (B1)	0.5	milligrams per 100 grams
Riboflavin (B2)	1.0	"
Nicotinic Acid (B5)	5.0	"
Pantothenic Acid (B3)	4.2	"
Vitamin B12	0.07	"
Carotene	.170	parts per million
(Vitamin A Equivalent)	28,000	International Units per 100 gr.)
Vitamin C	100	milligrams per 100 grams
Vitamin E	30	"
Allantoin	0.18	"

(Note the B12 figure of 0.07 ppm, the same as in Calf liver)

an element of utmost importance to the health, growth and reproductive capacity of birds, animals and people. In turn this vitamin proved quickly to be a far more effective check to anemia and even pernicious anemia in humans that the old liver extract treatment, which for a variety of reasons was not effective in many cases. The results in the case of pernicious anemia proved to be well-nigh miraculous, and as a result of the use of Vitamin B12 there are people walking about today, healthy and vigorous, who would have been dead before now but for the vitamin, discovered to be one of the products of old chicken litter.

But the chain did not end there. It was then discovered that Vitamin B12 cannot be formed in the absence of cobalt, one of the key trace elements which was discovered years ago to be the key to the cure of cattle and people suffering from anemia and the "salt sickness" and "droop neck" in areas of North Florida, Southern Georgia, Vermont and Michigan where there was an almost total deficiency of cobalt or cobalt

in available form in the soils.

To carry the chain of events further, one of the richest sources of Vitamin B12 is fresh cow dung which, as was known earlier, when it was fed to enclosed chickens, stopped cannibalism immediately. It also accounted largely for the health and vigor, rapid growth and resistance to disease in hogs following cattle, which nosed in the droppings. Vitamin B12 is actually formed in the rumen (first stomach) of cattle but in the absence of cobalt, Vitamin B12 can not be produced either for the cows themselves nor for the pigs or chickens that normally followed them on the old traditional style farm".

Comfrey and Allantoin

The healing power of Comfrey has been known historically for some 2,000 years, and we would probably find that it was used long before that if we could trace the records. But it is only modern chemistry that has revealed the basic secrets of its healing power. Even these are not yet fully known. But the recovery of Comfrey in this century is opening new understanding of its remarkable protective and healing powers.

Across Europe its popular names have been "Knitbone", "Wound-wort" and "Healherb", and its botanical name "Symphytum officinale" is based on what Dioscorides called it in Greek – "Symphuo" meaning "make grow together". The second name comes from the "Officina", the room in a monastery where medicinal herbs were kept, a name found in the botanical names of many plants.

Comfrey was in the British Pharmacopaedia up to 1912 as a remedy for gastric ulcers. Its healing action was recommended by William Turner in his "Herball" in 1568 (John Gerard copied from Turner in his better-known "Herball" in 1955) as a plant to "glewe together freshe wounds". This healing power comes fundamentally from Allantoin, which increases the speed of cell division and multiplication, enabling nature to repair any damage faster.

In order to help our understanding we set out some extracts from an out-of-print book published in 1936, now reprinted by the Henry

MacAlister

Doubleday Research Association,which holds the copyright. We express our gratitude to the HDRA for permission to use this material. It tells of the discovery of Allantoin, its chemical structure, and its effectiveness as a cell proliferant and healing agent.

The book is entitled "Investigation Concerning an Ancient Remedy and Its Modern Utilities". It comprises two parts, (1) Comfrey and Its Allantoin Content, (2) The Chemical Constitution of Allantoin.

Most of our quotations are from this work by Dr. Charles J. MacAlister,* MD., FRCP who personally conducted or participated in the experiments reported. The chemical analysis and research on the constitution of Allantoin are the work of Dr. A.W. Titherley D.Sc., Ph.D. Professor of Organic Chemistry of the University of Liverpool, England.

Our first and second quotations tell the story of how Dr. MacAlister became interested in Comfrey and its curative power. Later quotations deal with clinical experiments with Allantoin itself. My first quote is from pp.1-2. "About twenty-five years ago (1910-1911), when endeavoring to make some investigations concerning cell proliferants, I happened to remember that in 1896 I had published a paper in the LANCET on 'Blood as a Therapeutic Agent', in which were incorporated some impressions which I had formed concerning bodies contained in blood which I thought might inhibit irregular cell growth. On looking up this paper I found in the same number of the LANCET an exceedingly interesting address entitled 'Some Surprises and Mistakes', by Professor William Thompson, President of the Royal College of Surgeons in Ireland. He recorded the case of a man who was suffering from a tumor involving the nose and antrum which, on being removed, was declared by Dr. O'Sullivan, Professor of Pathology in Trinity College, Dublin, to be a round-celled sarcoma. The growth returned and the patient consulted Sir Felix Semon, on whose advice the jaw was removed and at the operation the tumor was found to occupy the whole of the antrum. The base of the skull was everywhere

* Chas. J. MacAlister M.D. FRCP., *Comfrey – An Ancient Medical Remedy*, H.D.R.A. publication (Reprint) 1975

infiltrated by it. It had perforated the septum of the nose to which it was adherent, and had entered into the opposite (left) nostril. A month later the growth had again returned; it bulged through the incision and almost closed the right eye. It was blue, tense, firm and lobulated, but it did not break. Further operation being out of the question the man was sent to his home. About three months afterwards the patient walked into Professor Thompson's study looking in better health than he had ever seen him. The tumor had completely disappeared from the face and there was no trace of it in the mouth. He had no pain, and after having an obturator plate made to fill the opening which was left by removal of the hard palate he went home apparently well. He told Professor Thompson that he had treated it by applying poultices of Comfrey and the swelling had gradually disappeared. Professor Thompson said in his paper: 'I am as satisfied as can be that the growth was malignant and of a bad type...I know nothing of the effects of Comfrey root but I do not believe that it could remove a sarcomatous tumor.'

There have been one or two cases in my own experience where undoubtedly malignant growths spontaneously disappeared, and the one which I have quoted may have been another example, but it set me thinking about the possibility that Comfrey might contain some substance capable of controlling or stabilizing cell-growth, and it naturally led to an investigation of the literature of Comfrey and to experiments being made with it clinically. At the time I had never heard of Comfrey being used medicinally. It was certainly not included among materia medica when I was a student, but it became evident from a reading of the old Herbals that it was regarded as an important and valuable remedy in bygone days." (End of quote) //

I myself remember a case while I was in India, of a man with a weeping ulcer on the back of his hand, a wound that had defied all modern methods for many months under treatment by the doctors at our local hospital. Hearing of the skill of one of the Aryuvedic doctors in a little village about 20 km away, the patient went there for treatment. Three weeks later he returned, and proudly showed me his hand. He reported that the village chief had applied the fresh leaves of one of the local shrubs. Foolishly I wasn't interested enough then to record the name of the plant. But the simple poultice had done in 3

weeks what modern drugs had failed to do in months.

My second MacAlister quote is from p.10.

"Some idea of the traditional therapeutic virtues of Comfrey may be gathered from the names by which it was popularly known. For instance Knitbacke (Gerrard 1597), Comfort Knitbene (Scotland). In Aberdeen it was called Comfort Knitbene, and a preparation made by boiling the root in oil or lard was extolled by old women for hardening and strengthening fractures. This property also accounted for its being called Bone-set or Knit-Bone in Lancashire. It appears to have been used in all districts both internally and externally for fractures.

A rather amusing letter received from a doctor in Lancashire in 1912 illustrates the faith of the people in Comfrey as a healer. He wrote: 'Three years ago I was called to see a girl with gastric ulcer, haematemesis and severe vomiting, and treated the case in the usual orthodox manner. In three weeks the patient was able to return to the mill. When congratulating the mother on her daughter's speedy recovery the old woman said to me:

'Do you mind my telling you something Doctor?' On my replying in the negative— 'Well', she said, 'my girl has never had a drop of your medicine and all she has supped is pints of strong Comfrey tea.'

Since this occasion I have found it an excellent sedative for the gastric mucous membrane." 3)

The next report is of a case treated at the time when investigations were just beginning into a then unknown substance which Dr. Titherley had found in Comfrey root. Dr. MacAlister began by dressing an ulcer with a strong infusion made from the powdered root of Comfrey.

"Professor Harvey Gibson had obtained a large quantity of the ground and unground rhizome, some of which was handed to Dr. Titherley, then head of the Organic Chemistry Department, University of Liverpool, and Mr. Norman Coppin, who was working in the laboratory of Professor Benjamin Moore (Biochemistry), and while they were making a careful chemical investigation of it, which took a

considerable time, I proceeded to dress the only ulcer which was then available with a strong infusion made from the powdered root.

This case was an exceedingly unpromising one because it was a 'rodent' (ulcer) of about two years' duration, not a simple ulcer.

The patient was a woman aged 87, and it seemed a suitable case for observation following the history of the malignant growth recorded by Professor Thompson which originated this research.

It was a stroke of fortune that this case was the first one to be experimented upon because, having resisted all kinds of previous treatment, the marked epithelial growth which took place upon it seemed more likely to be the result of a specific action of the application than would have been the case in an ordinary varicose ulcer, for instance.

It was a very large ulcer (measuring 4 by 3 inches) involving the skin and deeper structures over the upper thorax and it was slowly spreading, more especially by its upper margin which was high and undermined; the other margins were less raised. The base was irregular and there was some seropurulent discharge. After being dressed with the mucilaginous infusion for about a week the surface cleaned and a distinct ingrowth of epithelium could be seen taking place from some of the marginal points. Later on the upper margin flattened somewhat on its inner aspect, the undermining vanished, and after growing here and breaking down there for a time the epithelium became stronger and closed in to a considerable extent.

By this time Dr. Titherley reported to me that he had obtained a definite, so-far unidentified, crystalline body from the root and he was able to give me sufficient of this to experiment with. Since it was very sparingly soluble in water, quite a large amount of solution was made which was now used as a dressing for the ulcer, instead of the infusion. With this application the skinning over process took place more rapidly and in the course of a month was all but completed." 11

Quote (4) Quotation No. 4 also deals with the use of the powdered root of Comfrey.

"That infusions of the root are very active, however, was indicated by descriptions of cases treated with it which came from a variety of sources. One of the most striking was published in the British Medical Journal of June 8, 1912, by Dr. Charles Searle of Cambridge. The case had the following history:

The patient was a man aged 83, first seen on October 23, 1911. He suffered from shortness of breath, and swelling of the legs on which were some ulcers due to neglect. For some months his condition was very grave; he had marked arteriosclerosis, a loud aortic systolic murmur, with a feeble pulse and low temperature. The urine contained blood, albumin, and casts, but no sugar.

During December 1911, a fungating ulcer appeared on the dorsum of the left foot. It rapidly spread, and eventually exposed the metatarsal bones. In January 1912, the patient's condition appeared to be hopeless; he became at times delirious, and was removed home to die. He was then treated with four-hourly fomentations made with decoction of Comfrey root. The ulcer immediately began to fill up rapidly and was practically healed by the end of April, and the patient's condition made corresponding improvement." "

Quote (5)

In presenting quotation No. 5 we will restrict the story merely to the identification of Allantoin as the active substance previously unidentified but discovered by Dr. Titherley to be contained in the Comfrey root.

" "In his preliminary examination Dr. Titherley established the facts that the root contained:

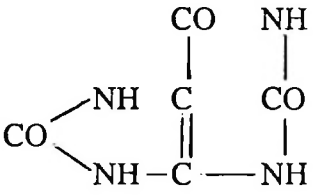
1. Gums
2. Sugars, including a reducing sugar
3. Resins
4. A protocatechuic derivative or derivatives
5. A substance giving an intense yellow solution with sodium hydrate (not investigated further)
6. A crystalline solid, which was isolated in a pure condition. It was very rich in nitrogen and melted at 226°C. Since from clinical observations this latter body

appeared to be the physiologically active constituent of the root, Mr. Coppin was asked to devote his attention to its investigation. Ultimately Dr. Titherley and he found that the root contained about 0.8 per cent. of this crystalline substance, and by accurate determination of its carbon, hydrogen, and nitrogen contents showed that it possessed the same empirical formula as allantoin, which it greatly resembled in its chemical properties.

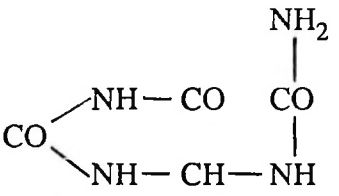
ALLANTOIN

Some allantoin was now prepared from uric acid, and the product from the root was proved conclusively to be an identical substance by chemical methods. For example, allantoic acid and other derivatives were prepared both from the chemically made allantoin and from that obtained from the root; their melting points were the same, and so forth.

Allantoin ($C_4H_6N_4O_3$) is a compound which is obtained by the alkaline oxidation of uric acid in the cold.



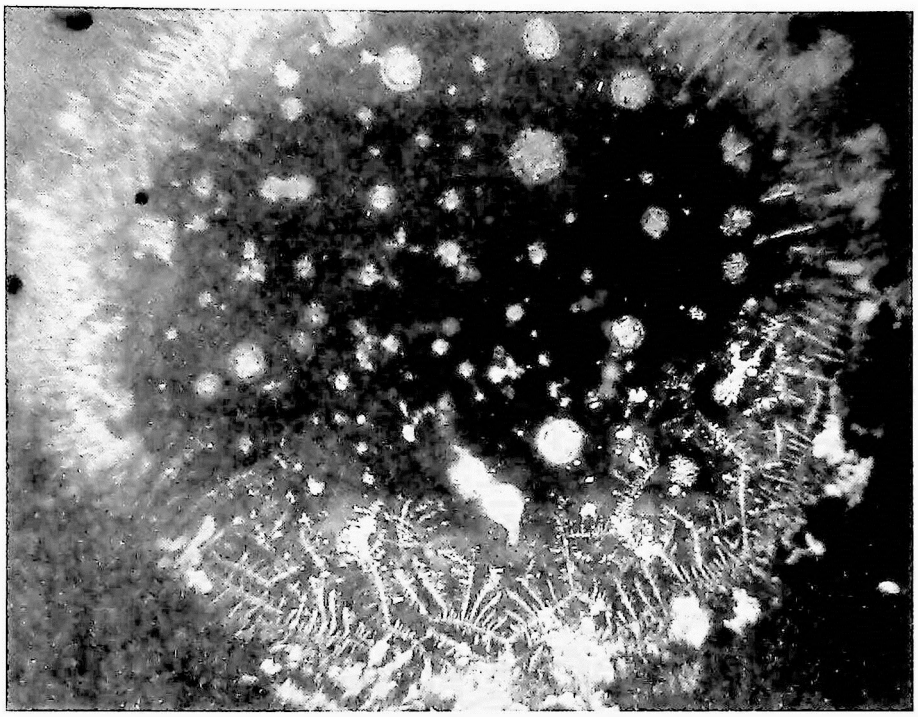
Uric Acid



Allantoin

MacAlister book

There is so much of value in this little 60 page book on the cell proliferation and curative power of Allantoin as recorded by Dr. MacAlister, that the Henry Doubleday Research Association republished the book with valuable additional material in its 75 enlarged pages, including a section on the analysis, cooking and cultivation of Comfrey. It also contains a report on the effective use of Comfrey by Dr. H.R. Kirshner from his "Nature's Healing Grasses", published in 1960. His article is entitled "Experiences with Comfrey in Medical Practice."



The crystals, like herring bones, are Allantoin (Diureide of glyoxylic acid) the medicinal healing principal in this crop, a bonus for every pig and calf raiser.

Some more information about Allantoin is worth noting as one of the elements that make Comfrey unique. Allantoin is produced in the Allantois, a gland in the umbilical cord that is the link to the mother and feeds the embryo in her womb. Its function is to promote rapid cell growth for the child to be ready for birth at the appropriate time. It is also contained in the mother's milk for the first three months, promoting the rapid growth of the baby, then slowly fading out. This process also goes on with the cow and other mammals, and as we know, calves that are quickly taken off the mother often suffer from scours, being deprived of nature's protecting and promoting provision. It has been found that such calves, so often expected to survive on skim milk, can be cured of scours by the addition of the juice of Comfrey added to their milk.

Allantoin is found in many plants at the flowering and seed forming stage and then disappears. Comfrey stores it in leaf and root, and in the winter, while the plant is dormant, it is in the roots, accounting for the rapid growth in the spring and the speedy growth that ensures the 3-4 kg of leaf in mature plants at every cutting, usually at some 3 to 4 weeks.

The Story of Comfrey (No.3)

[This article appeared first in Mainichi Daily News, Japan, on Oct. 18, 1967, the third in a series written by me especially for the paper.]

In this article I want to concentrate on the problem of maintaining constant good health and keeping free from illness and infection. We expect peak performance of athletes and race horses, but overlook the fact that these should be but symbols and an inspiration to maintain top physical condition for all of us. Whereas we could operate throughout life at somewhere near 100% we seem to be content to struggle along at 50-60% most of the time, subject to infections, tiredness, worry, depression; beset with the fear of serious illness such as cancer or heart or one of the other killers, doomed to grow old too soon, maybe flat-footed with overweight or fearing loss of beauty or virility, and with vitality going up and down like a Dow-Jones stock chart.

We do not claim of course that Comfrey will achieve the miracle of 100% fitness, lifting you overnight from a sixty percenter to a ninety percenter plus, but that it will make a major contribution to this rising graph of efficiency we can say with confidence born of experience — our own and that of many others.

Science Confirms Folk-lore

Time and again science is confirming what earlier generations believed on the basis of folk-lore. All over the modern world the search is going on to find effective plants and herbs to be used for health, and old remedies are being tested by new scientific methods. This is true

of comfrey. Long before quinine was understood and extracted to use against malaria and other ills, Chinchona bark was used for this purpose. One species is known as Chinchona Officinalis. The name "Officinalis" is given for the same reason that one of the parent plants from which the hybrid COMFREY we use was developed, is called "Symphytum Officinalis", classed as a medical herb and kept in the herb room, the "officina" of the monasteries.

Modern science is revealing the wonderful chemical structure of Comfrey. Science has now confirmed the ancient claims of China for Chosen Ninjing (Jinseng) and the pieces of the jig-saw puzzle are falling into place. The reasons for Comfrey's effectiveness are also becoming clearer, even though there is still much to be learned.

Strengthen the Organism

One main use of Comfrey should be to prevent sickness. While it is true that it can be used to cure many ills, the approach we want to emphasize is prevention, which is so much better than cure.

Scientific research must continue to study deeper and deeper into the nature of the human body and all its separate parts – studying more and more about less and less, even to the most minute part of each atom.

But ordinary people like ourselves are concerned with the body and mind as a whole. We are not just concerned with stomachs or lungs or hearts. Man is a total organic unit, made up of many functioning parts. So as we search for good health, as we try to preserve life against illness and aging, as we try to keep vital and beautiful, we have to regard ourselves as a functioning whole unit. Within this working unit which is "Myself" I must find strength and resistance to age and disease, regarding my body and mind as a single functioning machine made up of many parts that should all work together in harmony and balance.

So when we talk of Comfrey we think of its action on the whole body, not only on one part. It does not act on one part only. It is not a drug. It is a food. Medicines may have an immediate effect and you may feel different almost at once but the effect does not last. But

Comfrey does not act this way. Because it is a food it must be metabolized like all other foods. This means that to get the benefits of Comfrey it must be taken regularly and consistently. The effect of a drug may be immediate, but it is not long-lasting. The effect of Comfrey is long-lasting because it is built into the very cells of the body, and should be used regularly and consistently as a food because it penetrates to every part of the body and brain, improving both the structure and function of each part.

One simple related biological fact needs to be noted. The half life of the proteins of the human body is about 80 days. "Half life" means the time required for half of the amino acids in the body protein to be replaced by other amino acids. This clearly indicates that lasting results can be expected over a three month period, even though within seven days of regular Comfrey taking substantial improvements can be felt throughout the body.

The reasons for the lasting and total improvements in health are very clear. First, its elements are the structural material of which the body is built, the proteins and minerals, plus the catalysts that enable the metabolism to operate more efficiently – vitamins, enzymes, etc. Secondly, its two unique elements, Vitamin B12 and Allantoin, act directly on the blood stream: B12 to create red corpuscles and Allantoin to regulate cell formation and increase white corpuscles.

Once the blood is affected by this food intake, the whole body is reached, even to the tiniest hair, the most remote cell, the tips of the nails, the cells of the brain, the marrow of the bones. Every part of the body functions better and the body as a whole is more resistant to the attacks of disease and aging that follow the breakdown and failure of the worn out cells to recover and reproduce.

Life is made "whole".

Balance

The engineering principle of perfect balance is equally important to the body as to an engine. Without this no engine or engine part can operate effectively without a breakdown. The more perfect the balance

the sweeter and more silent the operation. The same applies to athletics. We are seeing more and more world records broken in athletics, swimming, jumping and all sports. The reason is the perfection of the body machine, with movement in more perfect rhythm – balance.

This principle applied to physical well-being is demanding that we look again at the matter of food and the body's needs. In the intake of the essential elements of food, the restoration of balance is one of our most urgent needs, so that the body may function in balance. Antibiotics won't do the job. Drugs and synthetic pills won't do the job. In fact, while these may be necessary at times, the evidence is increasing that they throw the body-balance out, and even if special treatment is sometimes necessary, our aim should be to get past the need for pills, potions and injections and return to a natural balance of foods as soon as possible in order to approximate to 100% health, normality, natural good health.

Get Your Vitamins and Minerals in Your Food

This is easier said than done. There are common and almost universal deficiencies in the modern diet: 1) Vitamins (especially the B Complex), 2) Essential Amino Acids, 3) Minerals (especially the micro or trace minerals). In seeking "balance" in food it is necessary to take these three factors into consideration. Everyone knows now that the Vitamin B Complex and Vitamin C must be added to the diet of white bread and white rice eaters. But few people seem to realize how much depends on getting these naturally in balance IN our food. To add synthetic vitamins by ones and twos, done largely by guesswork, instead of with the full range in natural balance, throws the body out of gear.

It is here that Comfrey comes to our aid. Comfrey is just a common Borage by species, a stockfood and vegetable. Yet is it? Its analysis has revealed that it must be placed in a very special category, the category of an important health food, which, when taken in concentrated form, such as taken each day as tablets of pure dried leaf, will help to balance the body needs by providing a wide spectrum of Vitamins, B1-B6, B12, A, C, E, and others, in remarkable balance. As we have said, Vitamin B12 is found abundantly in Comfrey—the only land plant

known to store B12. It is this Vitamin in Comfrey that partly accounts for its miraculous affect on the red blood count, quickly lifting the red corpuscle count in cases of anemia and low vitality. Vitamin B12 in Comfrey is the same as in calf liver, 0.07 ppm.

Amino Acids

We have known for a long time that the protein content of dried Comfrey leaf is very high, especially for a vegetable. 36.6% is the highest figure achieved so far, recorded in 1962. A test conducted this year gave 34.6%; but the most significant fact revealed by recent research is the high incidence of four of the most important amino acids, Methionine, Tryptophane, Lysine and Isoleucine in Comfrey. The figures are as follows:

	Methionine	Tryptophane	Lysine	Isoleucine
In the Dry Leaf	0.58%	0.64%	1.41%	1.15%
Each Amino Acid in the Protein	1.7	1.8	4.1	3.3

The significance of this becomes clearer when one begins to realize the role of these amino acids in relation to health. Note especially that these belong in the "Essential" amino acid group, i.e., they are not synthesized in the body; they must be taken in the food every day. The Essential Amino Acids should comprise not less than 6% of the protein intake. To illustrate their value one can cite the following: A report published this year (1966) on recent research has revealed that Methionine helps the body to eliminate Cholesterol, and so reduces fatty tissue and blood pressure. Tryptophane has been shown to be effective against atomic radiation, and the doctors doing the research have also claimed that it is effective against some kinds of cancer.

A deficiency in childhood of some of these essential amino acids, especially Lysine, seriously affects the mind as well as the body, retarding learning and mental capacity.

These are newly discovered facts, and as research goes on, the

reasons for the effectiveness of Comfrey in so many different cases are becoming clearer. Comfrey is now under test by the H.D.R.A. to improve the protein diet of Mexican children. A deficiency of the amino acid, Tryptophane, leads to cataracts and blindness in middle life, a common disease in countries like Mexico and India where amino acids are seriously deficient in the diet. Comfrey can therefore make a major contribution to the improvement of the diet of the people especially of Asia and other countries where protein and vitamin deficiencies are so widespread.

Mineral Deficiencies

Most overlooked in modern diet is the mineral deficiency. Rich and poor alike suffer from this, because it is the cumulative result of farming, especially intensive modern farming. Attempts have been made over the past 30— 40 years to overcome some major deficiencies in this respect, and some notable results have been achieved. Greatly improved soil fertility, improved pastures and health of stock, greatly increased stock-carrying capacity of marginal lands are all tangible benefits from the application of the trace minerals, copper, zinc and boron, etc.

Agricultural science generally acknowledges that plants need 16 nutrients for growth, three being taken from the air and water, and thirteen being taken from the soil itself. These 13 include the 3 major elements, N.P.K., 3 secondary elements and 7 micro or trace minerals.

But modern research is showing progressively that there is much more to soil fertility, plant growth and human and animal health than only these 16 nutrients. This idea is not new; it is only that we are coming to understand it better as time goes on and research continues.

Dr. Kirschner has pointed out in his book, "Are You What You Eat?", that a shortage of calcium will cause rickets, iodine deficiency causes goitre, anemia develops from a deficiency of iron and copper, thyroid trouble comes from zinc deficiency, tonsillitis results from a deficiency of silver. Calcium, phosphorus and fluorine deficiencies lead to tooth decay; and so the story goes on with manganese, molybdenum, magnesium, boron, cobalt, vanadium, selenium, etc., some of which we

scarcely hear of.

Let us go back further. Dr. Charles Northen in "Modern Miracle Men" writes, "Do you know that most of us today are suffering from dangerous diet deficiencies? The alarming fact is that foods; fruits, vegetables, grains, meats, now being raised on millions of acres of land that no longer contain enough of certain needed minerals, are starving us of essential minerals no matter how much of the foods we eat.

Sick soils mean sick plants, sick animals and sick people. Physical, mental and emotional fitness depends very much on a proper proportion of minerals in our foods. Nerve function, nerve stability, nerve cell-building likewise depend on these. So many vegetables grown today are as weak and under-nourished as anemic children. Look at the pests and diseases that plague them! Insecticides (which in turn poison animals and man) cost farmers nearly as much as fertilizers.

A healthy plant however, grown in soil properly balanced, can and will resist most insect pests. This very characteristic makes it a better food product. A really healthy plant will take care of itself in the battle against insects and viruses and fungi"...for instance, in an orange grove infested with scale, when Dr. Northen restored the mineral balance to part of the area, the trees growing in that part became clean while the rest remained infested. By the same means he grew healthy rose bushes between rows of rose bushes riddled with insects. He grew tomato and cucumber plants, healthy and diseased together where the vines intertwined. Insect pests ate up the weak plants, deficient in minerals, but refused to touch the strong plants to which trace minerals had been fed.

Is it not reasonable to draw the analogy of the disease-resistant plant and the disease-resistant human body? It has been demonstrated with cows and pigs and chickens that this principle applies to them as it does to plants—give them a mineral-rich diet—feed cows on pastures that have been grown on soil balanced by supplying the micro-elements (not just 7 of them) and they are resistant to disease and give a better yield of milk and better beef.

It applies equally to man, that resistance to disease comes naturally

from within if the diet is balanced. Here is the physiological reason. In the building of many of the proteins in the body structure, including the blood, many metallic or mineral elements are necessary, including many rare elements in addition to the commoner iron, magnesium, copper, manganese, etc.

In this respect Comfrey plays a very important role.

1) Comfrey (Symphytum Peregrinum) if properly grown, is a deep rooted plant, the main roots going down as far as 3 meters, depending of course on the soil structure. It is here that the trace minerals are found, having leeched through the top soil to the subsoil. It is this same deep rooting characteristic that gives Alfalfa much of its special value as food, because being deep rooted, it goes down and brings up the micro-elements into the leaves. Alfalfa has also confirmed Dr. Northen's claim that insects do not become a pest on mineral-rich plants. Louis Bromfield demonstrated with first year and third year alfalfa grown side by side, that insects attacked only the first year plants whose roots had not yet got down to the subsoil.

The leaf of a mature (3-4 years) deep rooted Comfrey plant is a rich mine of trace minerals.

2) In order to ensure that even in poor quality soils (mineral wise) Comfrey will have adequate minerals, we have made it our practice for well-grown Comfrey to spray the plants at least 4 times a year with an organic micro-element concentrate made from seaweed. Not only does this improve the health, growth and vitality of the plants themselves, but this treatment increases the solids content of the leaf, minerals, proteins, carbohydrates, fats, by up to 20%. The leaf spray we use contains all the trace minerals, in fact more than 60 kinds of mineral elements, in natural balance as concentrated by seaweed from sea water. It contains 21 amino acids, enzymes, vitamins; a complete plant food, and its food value goes into the whole plant through the leaf, and is returned to the human body in Comfrey leaf, natural, organic and assimilable.

Here is one of the major reasons for the health-giving power of Comfrey.

"Prevention is better than cure". How often have we said it! But in spite of this we usually wait until we get ill before doing anything about health and a balanced diet.

Sub-Clinical Conditions

It has long been recognized that there are many sub-clinical deficiency conditions in otherwise healthy bodies. We don't feel ill and we don't go to the doctor, but we just don't feel "good". This rule applies to plants, to animals and to man, and the onset of serious illness or disease begins when these sub-clinical conditions lower resistance to the attack of germs and viruses and parasites. Comfrey taken every day will help to keep the body resistance high by eliminating the deficiencies from the diet, bringing it into better balance.

We are not suggesting that we should be so constantly conscious of the functioning of the body that we are always observing our "symptoms" and looking for illness. This is the road to hypochondria and to be avoided like the plague. A healthy body and a healthy mind should have such a feeling of "well-being" that good health and freedom from illness are expected as a consistent and natural condition. It is the loss of this feeling of "well-being" that calls for attention; or it may be just a feeling of "nerves"; these are the symptoms to be attended to, more often traceable to a diet deficiency than a psychological cause. They indicate a sub-clinical lowering of resistance.

We believe that vital health should be the normal condition for all men and women. Zest for life, interest in and desire for life, never overtired, freedom from nerve and muscular pains, no headaches, regularity of bowels; clear eyes and a clear skin – these surely should be what we expect to enjoy.

Comfrey will help to keep us this way!

[This article appears also as Appendix B in "Herbs: An Investment in Your Health", published in 1978 by A.J. Mackenzie Clay, Canberra.]

Part II

COMFREY in AUSTRALIA

In Explanation

For the information of Comfrey users in other countries, it is necessary to report the procedures and decisions that put a ban on Comfrey products in Australia.

The Poisons Schedule Committee of Victoria, on a review of the toxicological data pertaining to Comfrey, recommended to the Public Health Advisory Committee of the National Health and medical Research Council that Comfrey products be placed on the official Schedule 1 poison list. They used for reference the following main materials:

1. 'The alkaloids of Symphytum x uplandicum (Russian Comfrey), C.C.J. Culvenor et al., Aust. J. Chem., (1980), 33, 1105-1113

2. 'Structure and toxicity of the alkaloids of Russian Comfrey (Symphytum x uplandicum, Nyman), a medicinal herb and item of human diet', C.C.J. Culvenor et al., Experientia 36, 337, (1980)

3. 'Carcinogenic activity of Symphytum Officinale', I. Hirono et al., Japan National Cancer Inst. 61, 1865, (1978)

The Committee made the following recommendations:

The Poisons Schedule Committee considered that the available evidence against Comfrey was such that to promote the product as a health food was not in the public interest.

Based on the analogy with aflatoxins, the Poisons Schedule Committee considered it had a public health responsibility to recommend to the Public Health Advisory Committee of NH & MRC that Comfrey preparations should be placed in Schedule 1.

The responsibility for the decision rests fundamentally with the Commonwealth Scientific and Industrial Research Organization (CSIRO) its decision based explicitly on the work of Dr. Claude

Culvenor.

CSIRO News File of March 29, 1978 carries the following statement:

Dr. Culvenor's research group at Parkville has been studying these compounds, called pyrrolizidine alkaloids, which occur in such pasture weeds as ragwort, Paterson's curse and heliotrope – the last two weeds being from the same plant family as comfrey.

"At least four of these alkaloids are known to be carcinogens, and it is probable that the type found in comfrey is also carcinogenic", Dr. Culvenor said.

"While it is unlikely anybody eating comfrey in small quantities would suffer serious effects, its regular use as a green vegetable could cause chronic liver damage and worse."

"Plants in the same family have caused human poisonings in the USSR, Africa, India and Afghanistan after their accidental consumption in bread over a period of one to two years."

"The evidence of these outbreaks, considering the amount of the alkaloid we have measured in comfrey, suggests that daily consumption of two young leaves of the plant over a similarly lengthy period will lead to serious disease."

We all should note that last paragraph carefully. In a letter from Lawrence Hills some years ago he said that in England there are hundreds of users of Comfrey as food and tea but not one has ever suffered from liver failure as a result. Like ourselves, who have been taking not "two young leaves" but at least 85 grams (8-10 leaves) in tablet form, not for one or two years but in our case every day for 28 years, with no ill effects, a fact that makes nonsense of what Culvenor says.

Let me append a further note. There came into my possession through the mail on an indirect route, the photocopy of a handwritten personal note addressed, "Dear Marjorie", and after some technical

details about the alkaloids in Comfrey, it ends with this very revealing sentence, "Toxicity is probably low but I wouldn't like to eat it regularly. Regards, Claude."

This, from the man who is chiefly responsible for Comfrey being placed on the Poisons Schedule I, classified along with such poisons as arsenic, hemlock, belladonna and strychnine, and therefore unavailable to the general public in any form: leaf powder or tablets, as medicinal herb or health food or skin cream. This absurdity is the reason for our protest and demand that Comfrey be delisted and that it be made available again in Australia for use by the public as it had been since the time of Dioscorides.

It seems not inappropriate to ask, without imputing motives, who is benefiting from the ban on the use of Comfrey, in this highly commercialized profit-oriented consumer society?

Comments on Official Papers Received under Freedom of Information

I have obtained some 150 pages of official documents of materials related to the ban placed on the use of comfrey as a herbal remedy. After careful examination some relevant comments on the papers are called for.

The May 1978 reference comes under the heading, "Comfrey—A Dangerous Herb". The following statement appears on page 1:

> Dr. C. Culvenor of CSIRO's division of Animal Health at Parkville, Victoria, said (that) although Comfrey was widely used as a herbal remedy and folk medicine because of its reputed beneficial effects in wound healing and other conditions, it contained a toxic compound of a type known to cause chronic liver damage in poultry, livestock and primates, including man."

Comment: It must be pointed out that the ingestion of Comfrey leaves

has never been known to cause chronic liver damage to any of the living things referred to: bird, animal or man. He refers to cases in USSR, Afghanistan, India, Africa, West Indies and the USA.

> "At least four alkaloids of this type are known to be carcinogenic, although there is no evidence yet that they have induced tumours in humans. The evidence of these outbreaks, considering the amount of the alkaloid present in comfrey, suggests that daily consumption of several leaves of the plant over a period of years could lead to serious disease."

Comment: What are the facts? No one, rpt. no one among the many hundreds of people (including myself and my wife) who have taken Comfrey as a supplementary health food for many years has ever suffered serious illness or disease as a result. We have taken the leaf in tablet form for 28 years—an approximate daily amount of not less than 85 grams of green leaf, and have both enjoyed and enjoy good health to this day; as Lawrence Hills said in a letter to me a few years ago, there are hundreds of people he knows in England, members of the HDRA, who have likewise taken Comfrey daily for many years without ill effect; on the contrary, with great benefit to their health.

In November 1978 the following appears:
SUBJECT: Comfrey. Poisons Schedule Standing Committee.

> Extract from report. "At the May 1978 meeting, Dr. J.E. Aldred supplied some material which had been made available to him by Dr. Claude Culvenor of the C.S.I.R.O. Division of Animal Health at Parkville, Victoria, relating to the toxicity of comfrey.
>
> The Committee agreed that on present indications, whilst the toxicity of this material might require some warning, actual hazard probably only related to consumption of very large quantities.
>
> At the November 1978 meeting, Dr Aldred reported that no further information was available. The Committee agreed to keep comfrey under review pending receipt of further information from Dr Culvenor."

* * *

August 1983. Extract from report of same committee. Agenda item 9.12; Comfrey as a Prescription Item.

"The item relates to notification of the Victorian Poison Advisory Committee's decision to recommend prohibition of comfrey in all forms when prepared and packed for use by humans. For the PSSC's consideration was a transcript of the PAC minutes, together with the data. Dr Priestly informed the Committee that he was reviewing comfrey for the Food Science and Technology Committee and therefore suggested that the item be deferred to allow him to review all data together.

The Committee agreed to his proposal."

Comment: N.B. "To review all data together".

This is where a major fallacy lies. All data was not reviewed by the Committee, as I want to make clear after examination of the 150 or so pages of the material received under FoI.

November 1983. Agenda item 4.26, Comfrey.

"At the present meeting the Committee was notified that the Victorian Poisons Advisory Committee (PAC) had recommended a prohibition on comfrey. PAC requested the Committee to consider scheduling the plants, and provided for consideration, references quoted at the PAC meeting.

The Committee noted that no efficacy data was available for comfrey. It further noted that comfrey was currently unregistered in Australia.

The Committee noted that no human poisonings had been recorded. However, comfrey contained an alkaloid which had been shown to be carcinogenic and produce a cumulative toxic effect.

After discussion, the Committee agreed that scheduling was required for comfrey which was prepared and packed for internal use in humans. The Committee noted that the Food Science and Technology Committee (FST) had discussed comfrey in relation to honey contamination. It agreed to inform the FST and the PHAC of its decision and to draw the attention of FST to the use of the leaves of the plant as a salad vegetable.

The Committee agreed to propose the following recommendation:

RECOMMENDATION

Schedule 1 – new entry

COMFREY (symphytum) being preparations and admixtures for internal use of comminuted leaves or dried and powdered root or any part of the dried plant."

* * *

Comment: There are two obvious fallacies in this quotation from the minutes of the meeting:

(a) No efficacy data was available for Comfrey. This is false. The members had obviously not studied the subject. The efficacy data for Comfrey begins with the earliest Materia Medica written by the Greek physician (surgeon general to the army, we would now call him) Dioscorides, nearly 2000 years ago. It is found also in the officina of the monasteries in the middle ages, shown in the very name, Symphytum Officinale, one of the parent plants of our present Comfrey. Symphytum, the basic name, was given to the plant for its healing properties, meaning to grow (or flow) together, stopping the bleeding of wounds and causing rapid recovery of damaged cells. This empirical knowledge was later confirmed by modern science when the healing elements in the leaf of Comfrey were identified, analyzed and understood. Such records are found from the 16th century on. I refer elsewhere to the work of Dr. McAlister of Liverpool Hospital on this question. (See Chapter 4)

(b) The Committee (Food Science and Technology) had discussed Comfrey in relation to honey contamination (with alkaloids). Here is evidence of the ignorance of the Victorian Poisons Advisory Committee on the subject of Comfrey. The Comfrey grown in Australia is an F1 hybrid, a cross between Officinale and Asperimum, all from Webster's Giant, the commercial strain imported into Australia around 1956. Careful examination of this strain shows that the plants are predominantly No. 4 of the 20 or so classified clones. The flowers of these Comfrey plants cannot be penetrated by the honey bee, so to speak of alkaloid contamination of honey from Comfrey is sheer nonsense, revealing the inadequate knowledge of the plant among those who should be more accurate in what they say on the subject.

* * *

Let me take up now a further extract from minutes of the PAC, Victoria. Agenda item No. 12, Folios 4-8. (no date)

Dr. Claude Culvenor of the CSIRO attended the meeting, where he said "that essentially there has not been much change in the past 6 years concerning Comfrey."..."He felt that the question that members of the Committee had to consider was: how toxic was Comfrey and how much were people likely to get."

This is where the false extrapolations are made. Arguing from the intraperitoneal injection of alkaloids into 3-4 weeks-old baby rats to the ingestion of Comfrey leaves by animals and humans, he says that leaves (no size or age of leaf stated, an important factor that determines the percentage of alkaloid in the leaf) contain an estimated one milligram of total alkaloids.

"Chronic liver damage has to expected," he said, "at very low rates of intake...as low as 1 or 2 ppm in the diet with some alkaloids", but he concedes, "not with Comfrey alkaloids, of course."

He cites the case of human poisoning in Afghanistan, where wheat flour containing a high percentage of seeds of Heliotropium mixed with it was used for bread, with consequently a high level of alkaloids. He

omits the fact that this took place at a time of prolonged famine and that the victims, mostly young, were suffering from severe malnutrition; nor does he say that they were treated with high protein food and vitamin supplements, with a high level of recovery and low mortality rate.

There is one statement made by Dr. Culvenor that calls especially for sharp criticism. Asked about the "Messianic zeal behind the promotion of Comfrey" Dr. Culvenor said "that the main promotion has come from the Henry Doubleday Research Association, which was founded by L.D. Hills, who may or may not be an agricultural scientist but certainly is a good organic gardener", a case of damning with faint praise. Dr. Culvenor should know that the late Lawrence Hills had a number of important books to his credit on a wide range of agricultural subjects, beginning with his first book in 1944; one of his books was in print for 25 years. Before his death in September 1990 his knowledge and service to agricultural science were recognized by an honorary D.Sc. being conferred on him. Added to this was his regular broadcasting on such subjects as diet and organics. His life work, which led to the founding of the Henry Doubleday Research Association is being perpetuated by the National Centre for Organic Gardening in Coventry, England, a movement that will long outlive those who with faint praise would make light of his work.

In all the papers, not one case of poisoning or liver damage is reported from the ingestion of Comfrey. In Ecuador, Arizona and Jamaica the patients who suffered from Alkaloids of this type were affected by the drinking of traditional herbal teas made variously from Senecio, Crotalaria and Heliotropium and other herbs, most patients being infants or young children. There are reports also from Britain, Paraguay, Central India and the West Indies, where the diets of the children affected were low in protein, children 2 and 3 years old being given bush teas for coughs in many cases. The poorly nourished children with mal-functioning livers were shown to be very susceptible to the effects of the alkaloids in the bush teas administered for colds, etc.

One statement that appeared in The Lancet of June 27, 1981 is

worthy of special note. "People who consider the benefit of Comfrey to outweigh the (perhaps slight) risk involved may like to know that large mature leaves contain the lowest concentration of alkaloids"..."The external use of Comfrey preparations should not be hazardous since the alkaloids are converted to toxic metabolites by liver enzymes only after being ingested."

There is no need for further quotations covering cases in other countries. These are all set out in the official papers and leave one with undiminished confidence in the effectiveness and value of Comfrey as a health food and cosmetic aid.

Nor is there need for me to repeat what I have said elsewhere on the outbreak of veno-occlusive disease in N.W. Afghanistan in 1974. But the report in the Lancet (British medical Journal) Aug. 7, 1976 has some details that are very relevant to this whole question, showing how illogical it is to extrapolate from that and like cases elsewhere to the danger of similar alkaloids in Comfrey.

In 1970-72 the region had suffered from severe drought and the flocks of sheep and goats were mostly destroyed, the people suffering from an acute shortage of food. Mal-nutrition was an important factor leading to the outbreak. The poorest families were "disproportionately involved" in the outbreak that affected a district with a population of some 35,000 in 98 villages. Some 22.6% of the people showed all the evidences of liver disease when examined in 1975. The patients were treated with a high-protein diet, vitamin supplements, diuretics and drainage of ascites (dropsical condition) if necessary.

The cause of the outbreak was traced to the Heliotropium plants growing extensively in the area, including the wheat fields. Samples of wheat were examined and found to contain an average of 40 seeds (300 mg) per kg of wheat. The seeds were ground to flour with the wheat. The report says "the intake of alkaloids would amount to 1.46 grams, at a very conservative estimate".

* * *

Nov. 1983: Extracts from report of Poisons Schedule Standing Committee. Agenda Item 4.26.

Comment: After a thorough analysis of Pyrrolizidine Alkaloids, an internal report by Dr. Culvenor takes up the question of such alkaloids and their toxicity in the plant Echium Plantagineum. Experiments were done with rats, sheep and pigs, and reports stated that both sheep and horses grazing on a "pure stand" of Echium had died of alkaloid poisoning.

Again, from this collection of data comes the extrapolation to Comfrey, but again it must be stressed that there is not one case reported of liver damage to stock or man from the ingestion of Comfrey leaves.

Then comes the report of alkaloids in honey from the flowers of Echium and/or other alkaloid bearing plants. Let it be stressed again that the other elements in Comfrey, the high ratio of high grade protein, complete with all amino acids, and its high level and range of vitamins, plus its exclusive two elements: Vitamin B12 and Allantoin, put it in a category by itself. It can be considered probable that the low level of alkaloids even help its curative and preventive functions so long known in its history of effective cure. The experts have never studied this aspect. All we know is that the ingestion of Comfrey leaf has never been shown to cause liver disease to man, bird or animal. It has even been shown to be a curative agent in most serious cases. (See Chapter 4 on the Uniqueness of Comfrey)

Why the Taboo?

After examining both facts and fallacies, one must ask, how it is possible for Comfrey to come under an official ban? I became involved in this issue in 1978 when the following sensational headlines appeared in the press: "Scientists say herb is a killer". "An Australian herb recommended in a number of cookbooks could cause liver cancer if eaten regularly for two years, a senior CSIRO (Commonwealth

Scientific and Industrial Research Organization) scientist has warned". (The AGE, Melbourne, Mar. 15, 1978) A similar report appeared in the Adelaide Advertiser on March 20, "Herb threat to liver—CSIRO". Both articles were sent to me in Japan.

Comment: This is an incredible statement made by a 'Senior Scientist of the CSIRO', that the herb Comfrey could cause liver cancer if eaten regularly for two years. One only needs to realize that there are hundreds of people who have eaten Comfrey not merely for two years but for 10 years and 20 years without one case recorded of the development of liver cancer as the result.

The statement from the CSIRO appearing in The AGE says, "Dr. Culvenor said that although comfrey was widely used as a herbal remedy and folk medicine because of its reputed beneficial effects in wound healing and other conditions, it contained a toxic compound of a type known to cause chronic liver damage in poultry, livestock and primates, including man".

Comment: The fallacy of the extrapolation of this fact to the ingestion of the leaves of Comfrey is clear, when it is realized that there is no known case of chronic liver damage in poultry, livestock and/or primates, including man, caused by the ingestion of Comfrey.

"Dr. Culvenor's research group has been studying these compounds, called pyrrolizidine alkaloids, which occur in such pasture weeds as ragwort, Paterson's Curse and heliotrope—the last two weeds being from the same plant family as comfrey.

At least four of these alkaloids are known to be carcinogens, and it is probable that the type found in comfrey is also carcinogenic, Dr. Culvenor said".

Comment: Note the 'probable' about the carcinogenicity of the alkaloids in Comfrey. This is another false supposition, an unscientific assumption; the long history of the safe consumption of Comfrey leaves by both livestock and man refutes this statement about its "probable" carcinogenicity.

"Dr. Culvenor said it was alarming that people were advocating the growing and eating of comfrey without knowing its potentially harmful properties. He said comfrey was easily grown and propagated, and home growing of the plant was gaining popularity. The plant is a hairy-leaved perennial of medium height with leaves up to 25 cm long. It blooms in spring and summer with bell-shaped pink flowers in drooping clusters.

While it is unlikely anybody eating comfrey in small quantities would suffer serious effects, its regular use as a green vegetable could cause chronic liver damage and worse", he said. "Plants in the same family have caused human poisonings in the USSR, Africa, India and Afghanistan after the accidental consumption in bread over a period of one to two years".

My letter to The AGE said, "I enclose for your careful reading a report of investigations made into this now outdated idea, that shows how remote from the facts the comments of Dr. Culvenor are. Actually the doctor and his CSIRO group are some ten years out of date, as research in this began more than 10 years ago and was carried to a most satisfactory conclusion through the work of the Henry Doubleday Research Association of Great Britain, as the enclosed report shows. The report by Dr. Culvenor reveals that he has very limited knowledge about the history of the hybrid Comfrey, Symphytum Peregrinum, which we use, and its many medical and therapeutic uses, or about its parent plants, Symphytum Officinale and Asperimum.

There is no excuse for this kind of ignorance. I took this matter up in 1978 when the statements made by Dr. Culvenor appeared in the AGE (Melbourne) and the Advertiser (Adelaide). I wrote to both papers and to Dr. Culvenor in protest, and even sent him a copy of the book by Lawrence Hills, "COMFREY: Past, Present and Future". I can only suppose that Dr. Culvenor's obsession with alkaloids meant that not wanting to learn about Comfrey he did not even read the book, a fact that he has since admitted. He does not understand its history as a medicinal herb and high protein stockfood and even questions the validity of its history of nearly 2000 years, recorded first by Dioscorides in the first century A.D.

Picking Up the Gauntlet

His 'probable' about the effect of its carcinogenic alkaloids is without scientific confirmation. My wife and I are prepared to submit our own bodies to any medical and physical tests, as two people who take, in tableted powdered leaf form, the equivalent of 135 grams of green Comfrey leaf every day, which we have done for more than 12 years. I am now 76 years of age, and I work (and play) harder and longer hours than most men do at 40, and this means both mental and physical work, much of which I attribute by careful observation, among other factors, to the regular use of the hybrid Comfrey leaf as a food supplement. On the doctor's probabilities, we should be dead by now.' (March 22, 1978)

I sent a similar letter of protest to the Adelaide Advertiser on March 29.

However, the reports were taken seriously by Mr. Hills and the Henry Doubleday Research Association, the person and the Association he had founded being chiefly responsible for the revival of Comfrey in this century, its recommended usage and promotion as a stockfood and for human use as a supplementary food, healer and aid to health.

A warning was therefore issued by the Association in 1978 to protect the Association (a registered charity in England) and its committee collectively and severally against legal action for any alleged harm caused by the use of Comfrey—until such time as it could be proved that no harm could come from its use.

We can attribute Dr. Culvenor's inaccuracies about the 25 cm size of leaves and its pink flowers, to ignorance about the plant. The clone of Symphytum Peregrinum which we use gives us leaves 90 cm in length and 25 cm wide; the flowers are mainly Bishops Purple, fading to mauve as they age.

The reference to "human poisonings in the USSR, India and Afghanistan" were not from Comfrey but from some similar Alkaloids in other plants. Let us look at the facts. The official report from Kabul

says, "Following a 2-year period of drought, a very large number of patients with massive ascites (a form of dropsy) and emaciation were observed in north-western Afghanistan...these were typical veno-occlusive disease...caused by consumption of bread made from wheat contaminated with seeds of Heliotropium plants, which were shown to contain pyrrolizidine alkaloids".

"The alkaloid content in samples of the wheat flour varied from 0.500% to 0.186%... over 2 years the intake of alkaloids would amount to 1.46 grams at a very conservative estimate."

Similar outbreaks occurred in Jamaica from the use of Senecio and Crotalaria plants in the form of "bush tea", and in Arizona from the same cause. In all cases the emaciated victims belonged to poor families suffering from malnutrition. The treatment for cure of surviving patients was a high-protein diet, with vitamin supplements, diuretics and drainage of the ascites in some cases. How can one extrapolate from these cases to the use of Comfrey, with its low percentage of alkaloids, the whole leaf being eaten in normal use by stock and by humans, the leaf itself containing a high percentage of first class protein and a rich supply of vitamins?

Logic and reason seem to have been abandoned in order to make a case by using such cases as these to support the charge against Comfrey.

This action was followed by research on potential harm, if any, from the use of Comfrey, and the publication of the results of such research in a small booklet entitled, "The Safety of Comfrey". It contains a full Bibliography and Reference materials covering the question.

In the foreword, Lawrence Hills says, "I now have great pleasure in introducing this booklet by Mr. John Pembery, formerly a research chemist, who has made a complete investigation of the published work on Comfrey and the pyrrolizidine alkaloids. This should reassure Comfrey users in all countries".

Fallacious Extrapolations

Let us look at some of the unscientific extrapolations made to support the charge, "Comfrey is a killer".

How was the investigation made by the three Japanese scientists, Hirono, Mori and Haga, who were engaged in this research from the beginning? The alkaloid was extracted and injected into baby rats, and from this the resultant liver damage was extrapolated to the general use of Comfrey by humans in which the whole leaf is ingested. Culvenor's research followed the same procedure. This ignores the fact that on Culvenor's own figures the concentration of the alkaloids in the mature leaf was very low at 0.01% to 0.05%.

In "The Safety of Comfrey" we read, "One must question the relevance of projecting results based on intraperitoneal injections in baby rats to the effect on adult humans consuming the plant foliage". The report shows that it would require the alkaloids from 19,880 leaves of 100 grams each (28 times the body weight of a 'man-sized rat') to produce the result produced in a baby rat, even if such a projection were valid, which for a number of reasons is not. Rats do not necessarily predict the results in primates, man or monkey, especially when the usage of Comfrey by man is with the whole leaf, not the extracted alkaloid. How unscientific can one get!

With the publication of the HDRA report, one would have expected the controversy to have ended there. But no. We need to ask why in late 1984 the medical herb Comfrey with its 2000 year history of cure and health promotion should be banned as a poisonous herb and branded as a danger to health; not its cultivation in home gardens and use as a vegetable nor farm use for stock (though a warning was issued on that) but for herbalists and naturopaths to use and prescribe, and for its sale in health food shops for those who prefer nature's health aids to synthetic and artificial nostrums. It can be obtained in health food shops in other Western countries and in Japan, but not in Australia.

Is there any evidence that someone's health has suffered from taking Comfrey, using it as a food or medicine?

Is there any medical report that someone's liver has been affected by its daily use?

Have any stock: cows, pigs, chickens, goats, rabbits, or racehorses suffered from the daily intake of Comfrey leaves used as stockfood, either fresh or dried?

If the answers to these questions are consistently No, No, No, then why has this action been taken at this late date, thirty years since it was introduced into Victoria and six years after it was shown to cause no harm to livestock or man?

Let us consider a little hypothetical testing. Tobacco contains a number of alkaloids, one of the most potent being nicotine, making up some three fourths of the total alkaloids. It is highly toxic to animals and an effective insecticide. Extract it and inject it into baby rats. What would the result be? Death, of course.

Would the scientist then say, "Ban smoking"? We know that smoking is a widespread cause of lung failure and cancer, and that the nicotine acts as a transient stimulant followed by depression. And although the alkaloids are of a different type, the resultant health impairment is a proven fact. By contrast, no one has been shown unquestionably to have suffered liver damage from eating Comfrey leaves.

Or suppose we take the alkaloid, caffeine, and inject it into the veins of 3 weeks-old rats. Would the CSIRO propose a ban on coffee because the rat dies?

Or take pure alcohol (not an alkaloid) and do the same; would the CSIRO propose a ban on alcohol because people are dying all the time from cirrhosis of the liver from over-indulgence in alcoholic beverages.

Why Then the Ban on Comfrey?

Who is responsible for the ban, and why? A friend of Dr. Culvenor, writing from the Medical Research Council Laboratories in Surrey,

England, says of Dr. Culvenor, "He is a practical scientist, not a politician, and I suspect this was a political decision". But the politicians, in trying to justify the ban, say, "We cannot go against the advice of the experts", thus passing the buck back to the scientists.

Come down from that superior scientific level to the level of the ordinary people and what does it all amount to? It means denial of the right of the people to chose their own way of living and pursuit of health. Are the people so dumb as not to know what is good for them and what they want? Can they not understand the difference between what is harmful and what is not? Can they not see the difference between extracting a substance from a plant and injecting it into a baby rat, and the eating of the whole leaf of a highly nutritious plant that is both food and medicine?

Let me look at some points made in a paper by CSIRO.

1. It speaks of the HDRA as a non-scientific society set up by Mr. Hills. With some six very detailed scientific books by him relating to chemical-free gardening and related subjects, he must be counted a world authority in his field; his work on Comfrey cannot be dismissed or discounted.

2. "It is apparently assumed" the paper says, "that Russian Comfrey (a name long since abandoned as inappropriate) has the same properties as (Officinale) and that eating the leaf or taking it as a tea or green drink is also of medicinal value. Claims are also made that the medicinal value is due to the content of Allantoin and of Vitamin B12. Neither point has been substantiated".

This of course should be "due mainly or in part" to...which is the real claim made. Dr. Macalister, whose 1936 book has been quoted, proves the effectiveness of Allantoin, and surely the 0.07 ppm of Vitamin B12 in the leaf leaves no room for doubt about its essential food and medicinal value. This does not need confirmation nor can it be refuted by the CSIRO.

3. One true statement in the paper I am quoting is as follows:

"Promotion by the HDRA and the widespread interest in "natural" living, "organic" gardening and a reduction of dependence on synthetic chemicals and drugs has made Comfrey popular...Comfrey is available in health food stores in tablet, tea and ointment forms". That was true when it was written. It should still be true, as it is of other countries. The ban should be lifted.

4. "These compounds, known as pyrrolizidine alkaloids, are found in many species of the family Boraginaceae (the family in which comfrey occurs) as well as in Crotalaria, Senecio and some related species. They have been investigated in the CSIRO Division of Animal Health for many years because they have caused and still cause extensive poisoning of livestock in Australia."

This charge has never been made nor is there evidence that it could be made about Comfrey, either in Australia, or England, or Canada, or Africa or the U.S.A., where it has been used for more than 40 years as an animal and human food.

5. It can be estimated that an average human adult eating 5-6 leaves of Comfrey a day for 2 years or two leaves per day for 5-6 years could suffer liver damage.

This has been proved to be a fallacy by our own experience of 28 years of consistent (every meal of every day) use of Comfrey leaf in tablet form as a health food supplement and the ointment as a protective skin food.

Look again at Point 3 and ask who is to gain by Comfrey being banned as an alternative to the multiplying drugs, pills and so-called remedies put out by the pharmaceutical companies, with their enormous influence and power over the daily lives of the people and their purses. It is not the health of the people that is protected by the ban. It is the profits of the chemical and pharmaceutical industries.

An Authoritative Statement
Comfrey — the Facts

The following is from a newsletter sent to me after my MS was well advanced. With the authority of the publisher I add quotations from the article "COMFREY—THE FACTS", for its intrinsic value and relevance as a further authoritative statement on the Comfrey issue.

My quotations are from the December 1989 and February 1990 issues of "MEDI-HERB" Newsletter, published in Queensland. "...a group of well-meaning scientists actively lobbied the Australian government to have Comfrey restricted. The basis for their concern was just two toxicological studies, both of which have doubtful relevance to normal human use. The arguments generally used were related to pyrrolizidine alkaloids, not Comfrey itself, and their theme was that pyrrolizidine alkaloids should be entirely eliminated from human diet and human medicine. Their zeal saw Comfrey in some states of Australia receive a higher poisons classification than arsenic, hemlock, belladonna and strychnine".

After dealing with the question, "How Carcinogenic are pyrrolizidine alkaloids?" the article points out that this has never been fully studied, and quotes one scientist as saying, "As far as pyrrolizidine alkaloid carcinogenesis is concerned, an important part of the argument rests on the disputed identity of the lesions reported as hepatoma...it is noteworthy that there has NEVER been a link with PA intake in cancer or in veterinary studies, despite the recorded cases of livestock poisoning. PA poisoning (veno-occlusive disease) is high in Jamaica—due to indigenous herbal teas—yet the incidence of primary liver cancer is lower than in western countries".

Two other questions from this same Newsletter follow:

"Is it valid to generalize about PA's in terms of their toxicity and carcinogenicity?

In one study rats were fed green leaves of Senecio Jacobea (Oxford

Ragwort) and Comfrey in their diet. At 5% Comfrey leaves there was no sign of toxicity, but at 1% Ragwort leaves in the diet there were many signs of toxicity, including changes in liver enzyme activity. Even 20% Comfrey leaf in the diet did not cause the liver enzyme changes caused by 1% Ragwort. Comfrey PAs are therefore much less toxic to the liver than those of Ragwort. This would explain why Ragwort causes livestock poisoning whereas Comfrey is used as a livestock feed with excellent results. In fact there are no recorded cases of livestock poisoning due to Comfrey."

"What do the toxicological studies on Comfrey really show?

Despite all the rhetoric there are in fact only two full-scale toxicological studies on Comfrey. To quote other publications which merely interpret the findings of these two studies does not constitute additional evidence.

The first study by Culvenor and associates was concerned with the acute and sub-acute toxicity of the PAs extracted from Russian Comfrey (Symphytum x uplandicum) leaves. These PAs were administered by injection, so it is difficult to relate this to the oral use of the Comfrey leaf; but ignoring this we can still arrive at some pertinent facts. (See Table 1)

We can convert the injection dose of alkaloids in rats to the

Table 1
Toxicity Studies of Symphytum X Uplandicum Leaf Alkaloids, adapted from Culvenor et al Experientia 36 377 (1980)

ALKALOID DOSE	EFFECT FOR RAT	EQUIVALENT HUMAN DOSE OF LEAVES
284 mg/kg	Deaths	66,300 leaves
71 mg/kg	No effect	16,600 leaves
8.9 mg/kg (9 doses over 3 wks)	Reduced liver function	890 leaves/day

equivalent oral human dose of leaves based on the fact that a leaf consistently contains 0.33 mg of alkaloids whether it is old (large) or young (small). These projections are given in Table 1. Clearly from this information, normal human consumption of a few leaves per day does not pose an immediate threat to health".

"The dose needed for death is impossibly high. How could anyone possibly consume 66,300 Comfrey leaves at one sitting—more than a person's body weight in Comfrey. How could one even consume this amount over 10 days (or I may add, over some weeks). Yet a Coroner has reported, on the basis of medical opinion, that someone died of acute Comfrey poisoning. This is a travesty of common sense. Clearly it is impossible to die from acute Comfrey toxicity. Other factors must have been at play.

Even to show some mild impairment of liver function one would need to consume 4.5 kg of leaves per day for three weeks...yet there are two medical papers associating, by hearsay only, acute PA toxicity in the form of veno-occlusive disease with Comfrey medication. In neither case was it verified scientifically that herbal preparations used by the subject contained Comfrey. Also it was not ascertained that this was the only source of PA intake. This is a travesty of scientific method and a poor reflection on the journals which accepted these articles for publication. Doubly so, because once something is in print in a journal it is often quoted in a superficial way as fact."

In the Feb. 1990 issue of the Newsletter the following analysis is given:

How do the toxicological studies on Comfrey compare with those for commonly used plant substances?

Let us take tea as an example. Tea is the dried fermented leaves of Thea Sinensis, a herb indigenous to the Indian sub-continent. Tea contains caffeine and tannins, including tannic acid, as its main constituents. A superficial examination of the literature reveals the following: Caffeine is a known teratogen, a suspected carcinogen, and in animal feeding studies cause severe weight loss and thymic and

testicular atrophy. Tannins have demonstrated carcinogenic effects, they inhibit digestive enzymes, inhibit mineral absorption and are highly toxic to the liver and kidneys. Human deaths have resulted from the administration of tannic acid. The carcinogenic activity and toxicity of the tannins from tea have been demonstrated in animal experiments. In human studies tea can cause thiamine deficiency, constipation, and epidemiological studies have linked black tea consumption with rectal and oesophageal cancers. Of course, common sense tells us the normal use of tea is safe, but the scientific information taken out of context is quite damning, in fact more alarming than that for Comfrey.

It is worthwhile to examine why this considerable scientific evidence for the toxic nature of tea has not made headlines and has not resulted in tea being restricted or entirely banned in the public interest. Just as a series of promising pharmacological studies does not imply the birth of a new wonder drug, the findings of toxicological studies can be of only minor relevance to the common experience. Differences such as species studied, dose, form of dose, interaction with nutrients, and duration of dose all combine to explain why the results for tea and its components should have little bearing on the moderate consumption of the beverage. Qualified herbalists can therefore be forgiven for taking a similar stance about Comfrey. The main difference is that toxicologists and legislators are familiar with tea, but to them Comfrey is alien and unnecessary so they are prepared to believe the worst.

Assuming Comfrey was a proven carcinogen, what is the relative risk of drinking Comfrey tea?

Life is carcinogenic—so it has been said. Here we are undertaking an assessment of relative risk. Dr. Bruce Ames, a respected scientist in the fields of carcinogenicity and mutagenicity has recently published an article in the journal Science, entitled "Ranking Possible Carcinogenic Hazards". The review discusses reasons why animal cancer tests cannot be conclusively used to predict human risks, but such tests may be used to indicate that some chemicals might be of greater concern than others. An index was developed called HERP— Human exposure dose/Rodent potency dose. The information in Table 2 speaks for itself.

Table 2
HERP data from Ames et al Science 236 271 (1987)

SOURCE	CARCINOGEN	HERP
Conventional home air (14 hr/day)	Formaldehyde, 598mcg	0.6
Bacon, cooked	Nitrosamines, 0.4mcg	0.003
Comfrey tea (1 cup)	PAs, 750mcg	0.03
Peanut butter (1 sandwich)	Aflatoxin, 64mg	0.03
Diet Cola (354ml)	Saccharin, 95mg	0.06
One raw mushroom	Hydrazines, etc.	0.01
Wine (250ml)	Ethanol, 30ml	4.7

The Facts

So now we have the facts:

1. There is some doubt that pyrrolizidine alkaloids cause cancer outside of laboratory experiments.

2. The pyrrolizidine alkaloids in Comfrey are qualitatively and quantitatively less toxic than pyrrolizidine alkaloids found in known poisonous plants, e.g. Ragwort.

3. A toxicological study has shown that normal human use of Comfrey cannot cause death or toxicity.

4. The incidence of malignant tumors induced by long-term experimental feeding of high levels of Comfrey to rats is neither statistically nor biologically significant.

5. Toxicological studies of tea are far more extensive and alarming than those on Comfrey, yet tea is widely used without apparent harm or restriction to its use.

6. Even assuming that Comfrey was carcinogenic, the relative risk from

its normal use is insignificant when compared to normal exposure to other carcinogens.

A recent study of long-term Comfrey users tends to confirm the premise that normal use of Comfrey is not hepatotoxic. Biochemical tests revealed no evidence of liver damage in 29 users, even for those who had been regularly taking up to 25g/day for more than 20 years.

Anderson, P.C. and McLean, A.E.M. Human Toxicology 8 (1) 55 (1989)

Timing and Fallacies of the Neutze Case

What is known as the Neutze case created quite a sensation in late 1985, and was a shock to home Comfrey users, Naturopaths and Herbalists.

The story is this: A young man by the name of Paul Edward Neutze died in Auckland Hospital on October 31, 1985. The Coroner's report includes the following statement made by the police sergeant who investigated his death: "Mr. Neutze had no past medical history. He returned to New Zealand from Australia with severe liver damage. He underwent surgery at Green Lane Hospital on the 24 October; Multi-organ failure progressed with his demise at 11:30 a.m. on the 31 October".

The report, after citing the deposition of witnesses, the certifying doctor and the doctor who conducted the post mortem, says: "Having enquired when, where and how...Neutze...came to his death I found: That the deceased died at Auckland hospital on 31st October, 1985 from liver failure occurring as a consequence of excessive ingestion of Comfrey leaves". (Jany 23, 1986. [sgd] Stephen Osborne, Coroner)

This raises some questions that need to be looked at carefully.

1. The police sergeant says, "Mr. Neutze had no past medical history". But when he went to New Zealand he was suffering from "severe liver damage". How can the sergeant of police assert that he had no past medical history? Would the doctor who attended him not

want to know the background of his illness? Neutze must certainly have had a past medical history and was the sergeant merely unaware of it, but was still prepared to assert, "No past medical history"?

(2) The Coroner's statement says that the liver failure was "as a consequence of excessive ingestion of Comfrey leaves".

In the Auckland hospital report to the Coroner's Office the following statement appears: "Some months previously this 23 years old Caucasian man present (sic) to Australian Medical personnel with progressive liver failure. After a short interval he was sent to New Zealand where further investigations established that his liver failure was due to a large dietary intake of Comfrey leaves".

One must ask how it was "established" that his liver failure was due to the ingestion of Comfrey leaves. The most the report says is "it was reported that"; in other words it was only second hand, hearsay reporting, which of course can never "establish" the relation between cause and effect.

Two further points need to be made on this statement. How much Comfrey would Neutze have needed to consume to get enough alkaloids to affect his liver?

In my letter of Nov. 15, 1986 in endeavoring to get at the facts I said "Careful scientific analysis shows that Neutze, who weighed 69 kg, would have had to consume 1,656 kg of leaves, 24 times his body weight, which would mean some 20,000 fresh leaves of average size to give him sufficient levels of the alkaloids to cause liver damage. Dr. Koelmeyer says, "following some weeks of intake", which an examination of the facts reveal to be an impossibility.

Let us think back. Died Oct. 31. Went to N.Z. probably at least a month earlier. The report doesn't say. At the time it is asserted he had ingested much Comfrey for some weeks, another impossibility. He had been living at the Mt. Oak Community near Bredbo, in New South Wales. The time factor would put this at the months of May-June-July, when COMFREY plants are dormant in the winter; it does not grow

when the soil temperature is below 10°C. Then in the early spring it does not come into leaf growth but into flower growth with strong heavy stems that go up 1 m to 1.5 m in height. This continues for some 6 weeks and real leaf growth begins after the flower stems are cut, which brings us at least into October, when Neutze was already seriously ill in New Zealand.

These facts present us with two impossibilities:

1. The absence of Comfrey leaves where Neutze was living in the winter of that year.

2. The impossibility of eating enough Comfrey leaves in a few weeks for the alkaloids to affect the liver.

Dr. Koelmeyer in his report to the Coroner says, "In my opinion death resulted from liver failure occurring as a consequence of ingestion of Comfrey leaves". He bases this statement on his two preceding paragraphs, which read, "Comment. I have been informed that the deceased developed jaundice following some weeks of intake of Comfrey leaves. In an attempt to treat the changes that had occurred in the liver, a surgical procedure was performed bypassing some of the blood from the liver to the heart (meso-arterial shunt). Terminally the deceased developed proliferation of bacteria and fungi in the blood (septicaemia) with these organisms colonising various tissues of the body.

The changes in the liver are compatible with a diseased condition termed veno-occlusive disease, and this condition is known to develop following ingestion of various forms of leaves, including Comfrey".

Comment: This statement made by Dr. Koelmeyer that "this condition (veno-occlusive disease) is known to develop following ingestion of various forms of leaves, including Comfrey" contains a basic fallacy, a fallacy that comes out again and again in the subsequent debate. There is no evidence that the ingestion of Comfrey leaves has ever caused this condition in animals, birds or man. In not one of the cases cited, Afghanistan, Jamaica, etc. was

veno-occlusive disease caused by the ingestion of Comfrey leaves. Dr. Koelmeyer should be required to produce evidence to support his statement, that it "is known to develop".

Note that the statement on the ingestion of Comfrey leaves comes from Australia, the N.Z. doctor merely stating "I have been informed that...". By whom and by what means?

The report from the medical officer of the Auckland Hospital to the Coroner says, concerning his condition after the operation: "Some days after this operation the patient suffered a decline in his level of consciousness and showed no sign of improvement of liver function. He was therefore referred to the Department of Critical Care Medicine. He received care specifically directed at each of these problems. On approximately his 5th day in the DCCM he started to deteriorate again, due most likely to serious infection. Multiorgan failure became critical and despite aggressive measures such as cardiac stimulants (including adrenalin) high percentage oxygen, antibiotics and drugs to correct his acid state, he declined quickly and finally suffered a cardiac arrest, 11:30 hours on 31/10/'85".

This summarizes the Neutze Case. It can be left to the reader to judge the validity of the claims, so patently false, and ask, why was this story of a man who, according to a sworn statement, had no past history, cooked up at this critical time of a ban being placed on Comfrey as a poisonous herb. Pure coincidence, of course; not the unfortunate death of Paul Neutze, but the irrational explanations that are put up as the cause, arguments that could never be sustained in a court of law.

The Struggle to Have the Ban Lifted

The facts about Comfrey and related issues have been set out clearly and explicitly. Now we must examine the Sixty-four dollar question: Why has it not been possible to have the ban lifted? What attempts have been made and why have they failed?

Quoting from the Medi-Herb Newsletter again, we read,

"A number of important issues are embodied in the Comfrey dilemma, issues which have much broader implications for herbal medicine. Should a medicinal herb which has a long history of safe use be regarded as dangerous because it contains low levels of toxic chemicals? Should a medicinal plant be regarded as carcinogenic because it produces a few malignant tumours in inbred, susceptible laboratory animals when fed to them at unrealistically high levels over a whole lifetime? To address these issues requires rationality and good science, but above all, common sense. So far these have been lacking from the Comfrey debate."

It is time to take the question up again, and if possible, break the stalemate.

Scientists say it is a political decision. The politicians pass it back to the scientists, saying, "We can not go against the advice of the experts". This is simply a case of passing the buck and refusing even to properly consider the issue. We are asking that the question be considered objectively with full understanding, consistent with the known facts set out in these pages in some detail.

Some years ago, on the introduction by one of the cabinet members of the Labor government I took up the question with the then Minister of Health, Dr. Blewett; but the result was entirely negative. "We can't go against the advice of the experts"! Earl Kitchener, here on a visit from England and speaking as Chairman of the Council of the Henry Doubleday Research Association, met and raised the issue with the Minister. In his letter to me Kitchener says, "He was friendly but said he could not overrule his experts on the question of classifying Comfrey as a poison".

The strongest and most authoritative representation made to the government by experts is from professional Naturopaths and Herbalists, including Ms Dorothy Hall, representing the College of Herbal Medicine, and Ms Nancy Beckham, Naturopath and Herbalist, whose practice is in Sydney. The latter made the most thorough investigation

into the Neutze case and took sworn affidavits from those who had been associated with Neutze at the Mount Oak Community at Bredbo, N.S.W., which clearly showed the absolute impossibility of Neutze having consumed Comfrey leaves for some weeks, and tells of his refusal even to drink Comfrey Tea. They stress that the growing season for Comfrey on the Monaro plateau, where the Mt. Oak Community is situated, is November to March; that it does not grow in the winter season, when Neutze is supposed to have consumed large quantities over a few weeks, an impossibility, as has already been shown.

Nancy Beckham is a former secretary of the National Herbalists' Association, a body of experts on the subject of Herbs, and is the author of "The Family Guide to Natural Therapies", in which more than 100 specific health problems are listed, each with a description of the illness and the herbs recommended for their treatment. She speaks with professional authority on herbs and their uses, as well as on the Neutze case, which she has investigated most thoroughly.

In the publication "Australian Wellbeing" (No. 26, 1988) a very valuable article by Nancy Beckham appeared under the appropriate and challenging title, "Comfrey. A Herb in Search of a Victim". With her permission I quote from her article.

> "In 1984 the Australian Department of Health listed comfrey as a Schedule 1 poison. This means that the Department considers it to be 'of such danger to life as to warrant it being available only from medical practitioners, dentists, veterinary surgeons, pharmacists or persons licensed to sell Schedule 1 poisons'. The wording of the Schedule in respect of comfrey reads 'being any part of the dried plant, its extracts and preparations, for human internal use'. "

After discussing under seven points the illogicality of the Australian Poisons Schedule, and comparing the risks of the use of nitrites as a food additive in the curing of hams, meats and bacon, and the hallucinogenic properties of nutmeg, in point No. 8 she says,

> "8. One of the reasons the Department of Health gave for scheduling comfrey as a poison was that there are no known benefits. Yet,

allantoin, the therapeutically-active constituent of comfrey, is used in at least ten pharmaceuticals; for example, Rosken Medi-pulv antiseptic powder which 'helps nature heal fast'. Thousands of naturopathic practitioners and their patients could support this fact. Because comfrey is classed as a dangerous poison, it is not ethical for me to outline its therapeutic merits. As herbalists are politically and financially weak, governments are able to promulgate whatever restrictive legislation they wish, compared to, say, pharmaceutical drugs, pesticides, alcohol and so on. Tobacco is a known carcinogen and has no scientifically-proven value, but it has powerful backing."

With careful attention to detail, the writer examines the Neutze case, details of which I have already set out. Her conclusion is very explicitly stated in these words; "The Department of Health know of my findings and insist that their independent advice (presumably...) is that it was a clear case of Comfrey poisoning. I know it was not." (Letter to the author, 7 March 1988). In a footnote to a later letter (15 April 1988) the writer says, 1) "The Department of Health in Canberra responded to my investigations by telling me that I admitted he had eaten Comfrey, 2) An independent expert had established it was 'a clear case of Comfrey toxicity' and that they believed Comfrey was a danger to human health. Here are two patent fallacies used to stop the ban on Comfrey from being lifted. //

Among those engaged in the struggle to have the ban on Comfrey lifted and to restore it to its rightful place as a stockfood for cattle, sheep, poultry, pigs and a medicinal herb and health supplement for humans, none has done more as a representative of the general public than Mrs. Emsie du Plessis of Wagga Wagga in N.S.W.; she is well-known to us all for years past, and her name and voluminous writing on the subject are very familiar in both official and unofficial circles. I owe a great deal to Mrs. du Plessis for the abundant material she has supplied to me on this subject and her lengthy letters that speak so clearly of the active mind of one well into her eighties, a regular Comfrey user. I could quote extensively from her letters but this one will suffice. "Note: The doctors say "Comfrey could be catastrophic; not that it is or has been catastrophic. That makes them look silly".

It was through Emsie du Plessis that I came to know of what had been done by Dorothy Hall of the College of Herbal Medicine. Most significant of her many letters and activities to have the ban lifted was a statement she issued as President of the Australian Traditional-Medicine Society Ltd. (1984/5) with letters to be signed by Comfrey users and supporters and then collected and sent as a mass petition to the then Federal Minister for Health, Dr. N. Blewett.

I reproduce both here.

The Story of Comfrey

In June 1984 the Poisons Advisory Bureau, through the National Health & Medical Research Council in Canberra, decided that the plant Comfrey (Symphytum officinale) should be classified under the Poisons Act, e.g. "Substances or preparations which are of such extreme danger to life as to warrant limitation of their distribution to qualified persons and which require special precautions in manufacture or use".

This decision was made on some evidence supplied to the Council that the Pyrrolizadine alkaloids (some traces of these are found in Comfrey) had been proved to produce tumours in some laboratory rats. No opportunity was given to herbalist/naturopaths, whose training and skills include extensive experience of Comfrey use with humans, to supply evidence and submissions on this matter. Indeed, it was 'fait accompli' before we and the public had any official warning. Manufacturers, wholesalers and retailers were caught with vast stocks, (as it is one of the safest and blandest of all commonly-bought and prescribed herbs) which were then not able to be prescribed by herbalists or bought over the counter in Health Stores. This so-called 'dangerous' plant was only to be freely available on doctor's prescription and sold or dispensed by pharmacists, none of whom have in their medical or pharmaceutical training been taught one single word on Comfrey for decades; indeed, for centuries!

Repeated requests from long-term prescribers and users of Comfrey

to submit evidence counter to this absurd restriction were refused by the National Health and Medical Research Council and its administrative bodies. We were told "You can submit any evidence you like, but it won't change our decision". Since then, you, the general public, have joined us well in protests of all kinds; telephone calls and letters to State and Federal Members, protests to media (many of whom have told us it's "not really of interest" to them!), and word-of-mouth spreading of the Comfrey story. Due to your help, as well as to constant efforts made by the profession and the food supplement and retail suppliers, Government officials have begun to re-think this particular classification of Comfrey, and indeed all future submissions put to them on plant-substances and associated food-supplements, etc., especially when these are commonly used in health maintenance and simple preventive health care. Thanks to all our efforts, it seems that you may once again be given your choice of how you maintain your health and which area of medicine you wish to choose when illness occurs.

However, the last battle is not yet won! The Federal health authorities will only listen attentively if a vast public support lies behind our presentation to them of the valid and well-researched scientific as well as practical evidence that Comfrey, far from being a source of "dangerous alkaloids", is indeed one of the most bland and beneficial of all plant-substances used by us, in human dosage. Its effectiveness and safety in the care and treatment of gastric ulcers, of broken bones and sprains, and its proven effectiveness, in scientific trials, of arthritis-improvement, will be produced by us as a large body of evidence. YOU can help us, if you agree with our stand on your behalf, by completing this attached letter form.

Return this letter to:

* Your Health Store or
* The Secretary
  Australian Traditional-Medicine Society Ltd.
  558 Darling St., ROZELLE 2039 (Sydney)
  as soon as possible please!

More forms can be supplied to you on your request,
or ask your Health Store staff.

Thank you for your help so far! Keep up the good work, and we'll never have to fight such a battle again!

DOROTHY HALL
President – 1984-85
Australian Traditional-Medicine Society Ltd.

THE LETTER

The Federal Minister for Health Dr. N. Blewett, Parliament House
CANBERRA, ACT 2600
Dear Sir,

I support the efforts of the Australian Traditional-Medicine Society Limited, and other associated bodies, to apply to you for re-consideration of the recent scheduling of Comfrey under the Poisons Act.

I request a review of evidence and consideration of evidence formerly not given a hearing when this decision was made.

I submit that those qualified by training and education and experienced skill in the use of plant and allied substances should be consulted in above re-consideration of evidence.

I respectfully request the Minister's urgent attention to this matter, as large numbers of Australians use Comfrey in the form of tea, tablets, etc., and the removal of it from public availability is seriously disadvantageous to their health-maintenance. (It is by this regulation also removed in tincture and extract, and tablet form from qualified herbalists' internal individual prescribing for their patients)

Name: .....

Address: .....

Date: ..... Signature: .....

---------- Why Ban?

This brief summary of the attempts made to right this injustice brings us back to the second part of the question asked at the beginning: Why have they failed? What are the barriers against us?

1. There are the vested interests that would keep natural remedies from the public. This is part of the tyranny of the powerful pharmaceutical industry which produces the thousands of modern products of chemical science, the menace of the side effects of which is becoming clearer in our "advanced" society". (See books already referred to plus those listed below)

2. In official (governmental) circles there is widespread ignorance of and even lack of interest in traditional herbal remedies. This is what we are trying to rectify by providing accurate information, and trying to get the blinding blinkers off. The politicians can no longer pass the buck to the specialists and fob off their own responsibility to know the facts and serve the people by taking appropriate action.

3. And what about the doctors? I find considerable ambivalence in this professional field. For example, one of my professor colleagues in Japan raised the question of Comfrey with his doctor. "I don't like Comfrey", the doctor said. "If you take Comfrey you won't need me", a comment that says more about his prejudices than his intelligence.

By contrast let me tell you of a friend of many years past to whom I began sending Comfrey tablets from Japan a few years back. She is well into her eighties, and had been in a very frail condition; with the approval and support of her doctor she put herself on a regular Comfrey regimen similar to our own. Her doctor describes her recovery

as miraculous—she does her own shopping and gardening now and is brighter and sharper in mind and spirit than many much younger than she is.

In his book "Herbs. An Investment in Your Health", Mackenzie Clay, in addition to my article, The Story of Comfrey No. 3 appearing as Appendix B., also published my correspondence with Dr. Claude Culvenor of CSIRO and my protest letter to the press. As an introduction to his Appendix B, this is the publisher's note: "Andrew Hughes uses the word 'rot'. Dr. Culvenor in a letter to Mr. Mackenzie Clay used the word 'rubbish'. This seems to us to show that there are two absolutely opposing views and that reasoned investigation and calm reporting by the scientists is now needed".

Report on Lobbying To Have Restrictions Lifted on the Sale and Use of Comfrey Products

We went to Canberra on March 11 and 12, 1991, to meet and discuss this issue with some members of the Australian Federal Parliament who are in a position to institute a review of the question of the restrictions placed on the availability of Comfrey to the general public in Australia.

We desire to have the issue reviewed objectively with full consideration of the known facts, with the aim of having the restrictions lifted. The question of the ban (restrictions) is virtually a closed book to the people, and among the legislators themselves there is little knowledge of the medicinal herb, Comfrey, and its centuries-old history. Nor is the background to the restrictions placed on the herb generally known to either politicians or the general public.

The matter of the Therapeutic Goods Act and its regulations are related questions but not the fundamental point at issue. We agree with the need to protect the public against false and misleading propaganda associated with what are generally called health foods and food

supplements and to ensure that the quality of such products is maintained with uniform standards that apply in the whole Commonwealth, which is the aim of the Therapeutic Goods Act. But it is necessary to see that the Act is not so restrictive as to take from the people the right to choose their own methods and means of maintaining good health.

In making contacts and meeting people concerned, we were fortunate in having the help of the Hon. Barry Jones, M.P., a friend of many years past, and his secretarial assistant, Tony Lamb, to whom we express sincere thanks. We were able to meet members from both sides of the house, with some of whom we had already been in direct and indirect contact. And may I add, this saved us from becoming lost in those endless corridors!

As the subject of our interviews is strictly a non-partisan question, we sought and were able to meet key people of different parties.

The Hon. Peter Staples, Minister for the Aged, Family and Health Services, was high on our list of representative persons. As he was busy with official duties in a very busy parliamentary session, with both houses sitting, we were able to meet his assistant, Terry Counihan, in his office, to whom we set out the bases of our request for consideration.

We met two members of the Opposition, Dr. Bob Woods, Federal Member for Lowe and Shadow Minister for Health, and Wal Fife, Shadow Minister and Member for Hume. We had had previous contacts with both, direct and indirect, and were able to present salient facts to support our request for reconsideration of the basic issue.

Why Do You Take Comfrey?

"So you want to live five years longer?", he asked.

"No, I want to live five years better", I answered.

We were on our way by car to the railway station, returning to Tokyo after a seminar near Japan's sacred Mt. Fuji. This was back in

the early seventies. We were discussing nutrition and health, and naturally Comfrey came into the discussion with my professor colleagues, one of whom asked that leading question.

In a request to meet a representative of the Australian Democrats Party, we were introduced to Senator M.H. Lees of S.A. and again presented the same material and request.

That incident was recalled when Senator Lees asked that pertinent question, "Why do you take Comfrey?" My reply says a lot about the rationale in taking Comfrey. In explanation I pointed out that my wife (who was with me) and I both take in tablet form some 85 grams of green leaf of Comfrey every day, 10 tablets at each meal, which we have done for our 28 years of married life. The reason is to ensure a balanced diet while working intensely: teaching, writing and taking part in conferences. We left with Senator Lees a sample packet of Comfrey tablets we had brought with us from Japan, where they are always obtainable.

We are not strictly vegetarian but eat very little meat. We frequently attend meetings and conferences and eat the meals provided, which are not necessarily of a balanced diet, such as we normally try to maintain, and we eat at restaurants when traveling frequently by car. Though we grow our own vegetables (organically) as much as possible, our intense work program means often eating meals with some deficiencies in protein, minerals, vitamins and micro-elements, and we take Comfrey to make up for such deficiencies. We seek to build up and as far as possible maintain high resistance to common and uncommon infections.

For our discussions with the representative members we met I had with me copies of official statements of the CSIRO, which formed the basis of the restrictions and the listing of Comfrey on the official Poisons Schedule 1.

By sharp contrast I had with me and showed a photo copy of that hand-written note I refer to elsewhere, addressed to "Dear Marjorie", which, after discussing the alkaloids in Comfrey, added these words. "Toxicity is probably low, but I wouldn't like to eat it regularly.

Regards. Claude."

The request made by me, and speaking for many others who support this request, is as follows:

1. That the restrictions placed on Comfrey and its listing on Poisons Schedule 1 be reviewed objectively with all the facts presented from the people's standpoint, not purely from the academic and scientific claims but with the full evidence of empirical and historical knowledge and experience.

2. That Comfrey be delisted from the Poisons Schedule.

3. That Comfrey be made freely available to the public in Health Food Shops and like sections in Supermarkets in powdered leaf form, leaf tablets, leaf tea, skin creams and ointment.

In Victoria

Since drafting this Canberra report, I have been in touch with the office of the Victorian Minister for Health, Mrs. M. Lyster, whom I had hoped to see. But her office has asked me to prepare and submit evidence that will show the safety of Comfrey. It was the Poisons Schedule Committee, a State organ, that recommended that Comfrey products be placed on the Poisons Schedule. This is apparently the channel through which CSIRO made its recommendation that restrictions be imposed.

The report before me says, "Based on the analogy with aflatoxins, the Poisons Schedule Committee considered it had a public health responsibility to recommend to the Public Health Advisory Committee of the National Health and Medical Research Council, that Comfrey preparations should be placed on Poisons Schedule 1.

Four Fallacies

There are at least four fallacies in the arguments advanced in placing Comfrey on Poison Schedule I, and restrictions being placed on Comfrey and Comfrey products.

(1) Fallacy No.1: Arguing from an Analogy

The argument from the analogy on Aflatoxins. This is introduced because of the effect on the liver. It has nothing to do with alkaloids. If this is regarded as a valid reason based on an analogy, what about the alkaloid nicotine in tobacco? Should not smoking be banned? Whereas no one has suffered from hepato infection of the liver from ingesting Comfrey, people are dying of cancer from smoking, even from breathing in other people's smoke. And what about alcohol? People are dying from cirrhosis of the liver from over indulgence in alcohol. Should it be banned as analogous?

(2) Fallacy No.2: Extrapolating from Other Plants

Reference is made to Afghanistan and the illness and deaths from consuming bread in which heliotropium seeds (high in alkaloids) were mixed with flour. To extrapolate from this to the eating of the whole leaf of Comfrey is surely an irrelevant exaggeration and invalid. The same applies to the drinking of bush teas, including seneca and/or crotolaria, reported from a number of places.

(3) Fallacy No.3: Projecting Results from I.P. Injections

The argument based on the intraperitoneal injection of extracted alkaloids into the veins of baby rats is another extreme case of scientific misapplication. On p.12 of the booklet "The Safety of Comfrey", it says, "One must question the relevance of projecting results based on I.P. injections in baby rats to the effect on adult humans consuming the plant foliage."

(4) Fallacy No.4: Arguing from the Impossible

And on p.13, in analyzing the table given, it says, "From this table it can be seen that the dose required to produce the least effect in the rats, reduced liver function, detectable by a change in the proportion of the plasma proteins, is equivalent to the alkaloid from 5,607 leaves if administered to a man-sized rat".

* * *

For submission to the Vic. Dept. of Health I have prepared the following paper on the Safety of Comfrey, in which I quote extensively from the booklet with the same name published by the Henry Doubleday Research Association.

The Safety of Comfrey

This is the title of a small booklet published by the Henry Doubleday Research Association. The analysis and conclusions are irrefutable, no matter how criticized, and stand confirmed by wide experience, without exceptions.

It has been proved true by the thousands of people, who, like myself, have taken Comfrey regularly, on a daily basis, for many years past. There is no known case of the ingestion of Comfrey leaves causing hepatic illness, in either man or beast. If the warnings given by Dr. Claude Culvenor of the CSIRO were to be taken at face value there would have been hundreds, even thousands, of victims of hepatic poisoning amongst Comfrey eaters, both human and farm animal. But there has been none. My bi-monthly regular checkup at the clinic has again given me a clean sheet of good physical condition—blood analysis, blood pressure, chest, bowels, etc. and I turned 89 on January 21 this year; I am still working full time, walking daily for an hour or more, working in the garden, writing articles and reports—in other words, engaged in both physical and mental activity every day, as I have done for the 33 years I lived in Japan, and am still doing now that

I am back in my homeland, where I was born and bred and began my education, in Victoria, Australia.

First, let us see the Foreword, over the name of Lawrence D. Hills, which says,[1] "In 1978 I warned against taking comfrey internally because I was not prepared to risk harm to human beings or stock after the alarming statements in the press and on radio and TV by Dr. C.J.C. Culvenor of the C.S.I.R.O. in Australia. These concerned the pyrrolizidine alkaloids, on which he is a world expert, which the crop with which I have worked ever since 1948, shares with ragwort, crotalaria, heliotrope and other species, just as potatoes share alkaloids with woody nightshade (Solanum dulcamara).

The Commonwealth Bureau of Animal Health very kindly carried out a computer search through their records of 137,000 cases of stock poisoning by plants since 1972 and found only one concerning comfrey — nitrate poisoning in pigs from excessive use of fertiliser in Germany. The British Medical Journal (3/3/78 page 598) surveyed the literature and concluded, 'The carcinogenic response in animals was seen in response to continuous high dosing over long periods and evidence of liver intoxication preceded liver tumour development. The consumption of comfrey by man is generally at a much lower level and no examples of liver poisoning have been reported. People who have in the past taken or used products containing comfrey have, therefore, no cause for alarm'. This statement, and later correspondence in the Lancet, removed all justification for the 'Comfrey the Killer Herb', 'Comfrey Causes Cancer' type headline in Britain and Australia in the late 1970s.

I now have great pleasure in introducing this booklet by John Pembery, formerly a research chemist, who has made a complete investigation of the published work on comfrey and the pyrrolizidine alkaloids. This should reassure comfrey users in all countries." [1]

(sgd.) Lawrence D. Hills

After analysing the nature and records of pyrrolizidine alkaloids in other plants, such as Senecio, Crotalaria and Heliotropium and the effects on the livers of humans and animals, the senecio used for "bush teas" in Jamaica, in Afghanistan from the accidental inclusion of

Heliotropium seeds in wheat flour used for bread, and research done in Oregon State University, the research chemist, John Pembery then turns to Comfrey.

Omitting the graph and table used to illustrate his conclusions, we present here his record and assurance of the safety of Comfrey. (pp.10-14) This is followed in the booklet by a page of references and Bibliography, etc. We repeat the closing sentence from Mr. Hills, "This should reassure comfrey users in all countries."

[Copies of the 18 page booklet are available from HDRA at cost for anyone who wants to study the question in more detail]

Comfrey p.10-14 Safety of Comfrey booklet

"Although it is known that the species of Symphytum commonly known as 'comfrey' contain pyrrolizidine alkaloids, there appear to have been no cases in medical or veterinary records of humans or animals showing clinical symptoms of pyrrolizidine alkaloid poisoning from the consumption of comfrey.

A number of papers exist showing analyses of comfrey alkaloids, and there are other papers which are written to describe the effects of either feeding laboratory animals with comfrey as a proportion of their diet, or the effect of administering alkaloids from comfrey by intra-peritoneal injection.

In 1978 Cheeke and Carlsson of Oregon State University fed rats with diets containing various plant materials as potential sources of protein, the species tested being Alfalfa, Chenopodium, Comfrey, Amaranthus, Sudan grass and Atriplex. These diets were fed for 21 days to groups of six male rats whose initial bodyweight was approximately 125 grams. Of the six diets only alfalfa and comfrey gave normal weight gains when compared with diets containing conventional protein sources. Those rats fed the comfrey diet, which contained 38% dried comfrey leafmeal, gained an average of 4.8 grams per day and consumed an average of 19.9 grams of the diet each day. This represents 7.56 grams of dried comfrey leaf meal per day, or 158 grams

of comfrey leaf meal per rat over the duration of the experiment or 12% of the initial bodyweight. No abnormalities in these rats were reported and, in fact, they did best of the six test groups on experimental diets.

Two studies, which on the surface appear to condemn the use of comfrey as a medicine and an item of diet are 'Carcinogenic activity of Symphytum officinale" by Hirono, Mori and Haga in Japan; and 'The structure and toxicity of the alkaloids of Russian Comfrey (Symphytum x uplandicum. Nyman) a medicinal herb and item of human diet', written by Culvenor et al in Australia.

In the study by Hirono et al, dried comfrey leaves and roots were ground and incorporated into basal diet in definite proportions measured as dry weight, and these were fed to rats for various periods of time. After certain intervals of time had elapsed, the rats were killed and examined for tumours. At the start of Hirono's study the rats were from one month to six weeks old, at which age they had been weaned, but were very vulnerable to hepatotoxic effects from pyrrolizidine alkaloids.

The maximum time of administration of the diet containing comfrey leaf was 600 days, which represents a very large proportion of the life of a laboratory rat. For instance, survival studies in laboratory rats fed on various diets indicate that only 80% of rats would survive for 60 days. The control group in this study received the basal diet without comfrey, but unfortunately comparative survival of the control animals was not reported.

After six months on comfrey root diet, many rats developed liver tumours and it is clear that comfrey root is not a suitable item of diet for an extended period of time, even at a level of 0.5% of the basal diet. This, however, does not mean that it is unsafe to use comfrey root preparations for occasional medical applications. The effect of diet containing dried comfrey leaves is less marked and at the lowest level, of the 28 rats which were fed a diet containing 8% dry weight comfrey, only one showed a liver tumour at 600 days. If one uses the figures supplied in this experiment it is possible to plot a dose response curve

and conclude that a level of 4% to 6% of dried comfrey leaf in the basal diet would be unlikely to produce any tumours, within the conditions of the experiment. This appears to fit in with the other data in that a dose level of 15% comfrey leaf in the diet, the first tumour appeared after 14 months and seven liver tumours appeared by the end of the 600 days of the experiment out of the twenty-one rats. As the amount of comfrey is expressed as a ratio to the total diet, it is not possible to calculate the total amount of dried comfrey leaf directly. However it is possible to make a reasonable estimate. If one assumes that the rats consumed an average amount of twenty grams of standard diet each day, like the rats in Cheeke and Carlssons experiment, in 600 days a rat would consume 12 kilograms of basal diet. Twelve kilograms of such diet would contain 0.96 kilograms of dried comfrey leaf at the lowest dose reported. If a further assumption is made that the total alkaloid content of dried leaves of Symphytum officinale is 0.034% as reported in the appendix to 'Comfrey' by Lawrence Hills, then it is possible to calculate the possible total alkaloid consumption by the rats. This is 0.326 grams as a tentative estimate. If one conservatively assumes an average adult weight of 400 grams for the rats, this would represent a total dose level of about 800 $mg.Kg^{-1}$ of alkaloid spread over 600 days. In the light of subsequent results from other sources, this would appear to be a reasonable value. I am only sorry that I have been forced to make assumptions from other source material because of the inadequacy of the reporting in this paper. The total amount of dried comfrey represents about 240% of the estimated final bodyweight of the rat. As comfrey is almost 90% water in the fresh state, the rats would have consumed possibly twenty-four times their own bodyweight of comfrey expressed as fresh weight. At this level only one of the test rats showed toxic symptoms in the liver.

Because of the limitations placed on these estimates by the incomplete information in the paper by Hirono et al, such estimates can only be approximate and indicate the order of magnitude of the numbers involved. One can say, however, that in order to produce even a limited amount of liver damage in a rat it is necessary to expose the rat for a large fraction of its lifespan, giving the equivalent of several times its own bodyweight of comfrey leaves when the results are expressed as fresh material. Commencing the experiment soon after weaning also

ensured that the rats were ingesting comfrey at a time when they were most susceptible to liver damage from pyrrolizidine alkaloids. It is difficult to envisage a situation in which a human subject would assimilate an equivalent amount of comfrey over a similar time span, or an equivalent time span in their lives.

(2) On the 15th April, 1980 a paper was published in the journal 'Experentia' by Dr. C.C.J. Culvenor and his colleagues entitled 'The structure and toxicity of the alkaloids of Russian Comfrey (Symphytum x uplandicum., Nyman) a medicinal herb and an item of human diet'. In a very elegant piece of chemistry Dr Culvenor and his associates identified eight alkaloids in comfrey, four previously known and four new to science. This was particularly impressive when the concentration of alkaloid in the leaves was very low, 0.01% to 0.15%. On one point of accuracy, the paper misquotes the results of Pederson, saying that he found a concentration of 0.9% concentration of alkaloids in leaves, when his actual figures were 0.9 parts per thousand when estimated by titration and 1.9 parts per thousand when estimated gravimetrically. The second part of the paper deals with the toxicology of the alkaloids. These were administered intra-peritoneally either as a single dose to two week old baby rats, or as multiple doses commencing at two weeks of age. Although it may be argued that injection of the alkaloid into the body gives more certain delivery than oral administration, and that the toxic effects of the drug administered in this way will not significantly affect the result, it still does not seem logical to test a drug administered in this way (I.P.) when what is normally eaten is the leaf. Also it must be remembered that two-week old rats, still unweaned, are expected to be more vulnerable than adult rats to the effect of pyrrolizidine alkaloids. One must question the relevance of projecting results based on I.P. injections in baby rats to the effect on adult humans consuming the plant foliage. An actual LD_{50} was not found for the alkaloids in comfrey because the mixture varied, but values have been reported for individual alkaloids, such as echimidine ($200mg.Kg^{-1}$), and symphytin ($300mg.^{-1}$), and deaths were reported with the mixture at a dose level of $284mg.Kg^{-1}$).

As one comfrey leaf contained approximately one milligram of alkaloid in this particular research project it is possible to calculate the

number of leaves it would take to produce a similar dose level in man. As an average man is about 70 kilograms it would be necessary to use the alkaloid from 19,880 leaves to produce a dose level of 284mg.$^{-1}$ in an adult man. Also taking note of the fact that the dose was administered by I.P. injection and not by mouth.

It is possible to tabulate the results quoted in the paper to show the quantity of leaves required to produce the same dose level in adult man.

From this table it can be seen that the dose required to produce the least effect in the rats, reduced liver function, detectable by a change in the proportion of the plasma proteins, is equivalent to the alkaloid from 5,607 leaves if administered to a 'man sized' rat. That is, if we assume that the effect of the alkaloid in man is going to be the same as in a young rat, apparently the most susceptible of any animal so far tested. If an average comfrey leaf is taken as 100 grams, (and older leaves are much more than this), this dose level represents about eight times the body weight of the 'man sized' rat. Deaths occurred at levels equivalent to the alkaloid from 19,880 leaves or equivalent to 28 times the bodyweight of the 'man sized' rat. This approximation agrees very closely with the estimated figure obtained by projecting from the results of Hirono et al, which was that twenty four times the body weight of fresh leaf were needed to produce sufficient levels in the diet to produce any liver damage.

If humans were as vulnerable as immature rats to liver damage, and if these figures were less speculative, one could calculate that it would take sixteen years to accumulate sufficient alkaloid to produce a detectable change in liver function, if a person was to eat three ounces of comfrey leaf every day without fail. In order to reach the level of dose at which the recorded liver damage occurs it would take 56 years. If the response in humans corresponds to adult rats, one could probably extend these figures by a multiple of two to three. (That is 48 years for a change in liver function and 150 years for damage). Similarly the use of very large comfrey leaves would extend the safety level possibly by a multiple of two.

As I have said, these figures are only approximations based on a very limited amount of research, not completely reported, but they do indicate that at the very low concentration of alkaloid found in comfrey leaves the chances of accumulation sufficient to cause significant liver damage are very remote. If, as has been suggested, the alkaloids inhibit mitotic cell division (and pyrrolizidine alkaloids have already been shown to have some effect on tumours), is it possible that the records of comfrey in the treatment of cancer may be the result of these same alkaloids operating at a low concentration level? If so, surely this would suggest a more profitable line of research than trying to demonstrate the toxicity of the plant by inflicting massive overdoses on laboratory animals. After all, many of the most valuable drugs in medicine are toxic in high concentrations.

Summary

In conclusion, the research shows that although there are alkaloids of the liver damaging type in comfrey, there are such small quantities in the leaves that reasonable consumption of mature leaves, or of comfrey tea, even over a number of years, is unlikely to cause any problems. If people take comfrey for its nutritional or medicinal benefits, they may continue to do so without any undue concern. Probably they should be more circumspect about continued assimilation of comfrey root products, although the occasional topical application should cause no problems. The use of comfrey leaves as stock feed appears to present a large margin of safety because of the apparent detoxification of alkaloids in the rumen of cattle, sheep and goats, and the apparent resistance of rabbits and horses to pyrrolizidine alkaloids. Pigs are kept for such a relatively short time that there is no chance of them assimilating the large quantity of comfrey required to give them a toxic dose of alkaloids. It appears probable that the absence of veterinary records of alkaloid poisoning is because such poisoning has never happened, due to the large quantities of comfrey required, rather than because stockmen or veterinary surgeons have failed to correlate alkaloid poisoning with the consumption of comfrey, as has been naively suggested in some quarters. I cannot believe that an animal could consume possibly forty times its own bodyweight of comfrey without the owner or stockman being aware of the fact. 11

End p.14 of "The Safety of Comfrey"
by John Pembery

Part III

HISTORY of COMFREY

From "The Englishman's Flora"

I recently came across a description of Comfrey (Symphytum Officinale L.) one of the parent plants of Symphytum Peregrinum, the F1 hybrid we grow and use. Officinale is the Common Comfrey found everywhere; the following record is from "The Englishman's Flora" by Geoffrey Grigson, published by Paladin in 1975. After giving the various popular names of Comfrey in different counties of England, indicating its general popularity, he gives this description: "CONSOLIDA MAJOR, one of the favorite plants for making firm and solid, for consolidating, since it was taken to be the sumphuton of Dioscorides, the 'grow together' plant. Comfrey goes back by way of the old French confirie and the Mediaeval Latin Cumfiria to the Latin name Conferva in Pliny, from the verb confervere, to grow together. 'Tis an excellent Wound-Herb, is Musilaginous and Thickning, and qualifies the Acrimony of the Humours. (Mollifies the bitterness of body fluids) 'Tis used in all Fluxes, especially of the Belly, and for a Consumption. The Flowers boyl'd in Red Wine are very proper for those that make a Bloody Urine. Outwardly applied, it stops the Blood of Wounds and helps to unite broken Bones, wherefore 'tis called Boneset' (John Pechey's Compleat Herbal of Physical Plants, 1694)."

Gerard gives a long list of virtues, of which some are a little unexpected: "The slimie sustance of the roote made in a posset of ale and given to drink against the paine in the backe, gotten by any violent motion, as wrestling, or overmuch use of women, doth in fower or five daies perfectly cure the same, although the involuntarie flowing of the seed in men be gotten thereby."

Though common enough wild, Comfrey was grown as a necessity in gardens, and 'Comferie with white flowers' was taken over to New England in the 17th century. There it escaped and established itself. Comfrey leaves dipped in batter and fried are much eaten in Bavaria (See German Cookery books under Schwarzwurz) one of the most delicious of "wild" foods both to the eye, for the viridian leaf in the golden batter, and the taste. The leaves and stems can also be boiled".

It is no good picking Comfrey for its striking flowers. Like others of the Boraginacae, it at once shrivels, stems, leaves, flowers and all."

From "The Complete Book of Herbs"

COMFREY
Symphytum officinale
Boraginaceae

Traditionally known as the "Saracen's root", the common comfrey is believed to have been brought back to England by the Crusaders after they had learned of its great economic value to man. As a healing herb for open wounds, as a mucilaginous product invaluable in the treatment of chest complaints, and as a bone setter, the plant was quickly put to good use as a cottage garden plant around farm workers' and country dwellers' homesteads in Britain. Its name is from the Greek symphys, "I grow together"; and comfrey is probably a corruption of confirma, "a growing together". It has a predilection for the water-side and likes shade, but it is tolerant of many conditions, always excluding baked earth.

The hispid (hairy) nature of the whole plant gives it an unmistakable appearance; and the leaf stalks particularly at the base of the plant are winged. The fresh or dried leaves are still quite commonly used as a poultice or hot fomentation for sprained ankles and wrists. Its country names of "knitbone", "boneset", and "consound" stem from its use by the ancient bone-setters as a plaster or binding. The plant is rich in a watery but slightly viscous fluid which forms a paste easily and sets. The mashed white roots, which are brittle and black-skinned, can also be used as a poultice but are chiefly used to alleviate pulmonary and throat disorders, taken either as an infusion or as a milk. The gypsies know it best in this way: 1/2 ounce of crushed root is combined in a saucepan with 1 1/2 pints of equal parts of milk and water, and simmered for 20 minutes. A wineglassful will quickly ease an irritating cough, or a spoonful taken in the night when a cough becomes troublesome will put an end to wakefulness. If milk alone is used in the

preparation, the mixture is sufficiently gelatinous to set as a jelly when cooled. The root can be cooked as a vegetable; the leaves are rich in potassium and vitamin C and make a spinach-like dish when cooked; when served with a poached egg they provide a nourishing meal.

The flowers vary from creamy-white to pink and blue and are carried in June in a dangling row of bells; they are followed by black shining nuts as fruit. A tisane (infusion of dried or fresh leaves) of flowers or leaves is useful against colds and as a refreshing tonic. It is also widely used in the treatment of stomach ulcers and is known to help the strengthening of torn tendons, allay pain in strained muscles, and, in short, earn its vernacular names of "bruisewort" and "all-heal"! An infusion of the leaves and/or roots, applied as a fomentation as hot as can be borne, is claimed to be an almost certain cure for fibrositis, even in cases where the complaint is of long standing.

Propagation is easily effected by division of the roots in early spring, for the leaves start to form bold clumps quite early. The roots are brittle and almost splinter but settle down very quickly when transplanted, provided there is moisture-retentive material around the root run.

Symphytum tuberosum, the so-called "tuberous comfrey", has stout tuberous roots and grows wild, more commonly in the northern parts of Britain, in damp localities; its flowers are creamy and the whole plant less branching than S. officinale. "Rough comfrey" or "prickly comfrey", is S. asperum, introduced in 1779 from the Caucasus as a fodder plant but now naturalized in many places. The flowers are at first pink, maturing to a clear blue.

S. officinale coccineum is the best garden form to use; its flowers are a clear crimson. S. officinale 'Argenteum' has silvered leaves—a plant hard to find but an attractive addition to the herb border.

Macmillan Publishing Co., Inc. New York

Russian Comfrey

Russian Comfrey is a fleshy, high protein low fibre green plant. In analysis and yield it can outclass lucerne. Like lucerne it is a perennial, unlike lucerne it needs an organic source of nitrogen. Comfrey is an oddity preferring organic fertilisation and will willingly take fertiliser in the form of fresh manure—even fresh poultry manure will not burn it. Additionally, it is the only plant known which can synthesise Vitamin B12.

A typical analysis (dry) of Bocking 14, a popular variety, shows a total protein content of 34.6%. Yields in Southern Africa have been on the order of 100 tons per acre, with a dry net of 12.5 tons. Mr. J.P. Phillips, recently retired, at one time was the largest Comfrey grower in the world. Today he produces named variety rootstock stocks on a small scale. He makes the following points: Comfrey is an expensive crop to establish since it is done by costly rootstock propagation. The reason for propagation by rootstock is that this is all F1 generation material with a built-in factor.

Mr. Phillips is completely sold on Comfrey but he warns growers not to plunge in over their heads in an initial burst of enthusiasm. "It needs to be fertilised, irrigated and harvested often and kept clean, as like any plant, competition is detrimental to yields.

"It is obvious that it is not a crop to play with", he says, but done well, the protein return can be quite phenomenal."

What does Mr. Phillips consider the best use of Comfrey? "As a stockfeed", he says confidently. "In a time of protein shortage and escalating costs, it is imperative that dairy, poultry, beef and pig farmers strive for protein self-sufficiency". Mr. Phillips gives his views on Comfrey feeding:

Pigs are good converters of this food; they will eat it direct from the field as they do not require quantities of roughage. Fed to pregnant sows, Comfrey will insure a good milk supply and will consequently

provide sufficient food for the whole litter. Provide the green feed for the piglets from the start and they will become used to this food. The more robust will leave the runts to get the mother's milk. Comfrey will provide insurance against intestinal disorder and give a healthy litter. Pigs can eat up to 10% of body weight in Comfrey daily and being high in mineral as well as protein, will ensure great savings in feeds. Further, by experimentation, the producer can control the fat level in his pigs.

J. P. Phillips, knee deep in Comfrey plants, Zimbabwe (formerly Rhodesia)

Cattle. It has been found that calves fed on fresh Comfrey from birth will never give trouble in accepting it from then on, but when given to mature beasts some resistance is noticeable. It has been proved that most adults will take it readily enough in the dry months, however, if the leaf is dried it can be incorporated in feed or provided by itself and appears to be more acceptable in this form. Please note that calves will be free of scours and this is an important economic factor to both beef and dairy farmers. In America, cattle have been fed on pastures, with Comfrey as the concentrate, with no addition except salt.

Rabbits. Although it is recognised that this animal is not partial to foods with high potash content, experiments now being conducted show that Comfrey can reduce the feed bill and increase profit by preventing

disease. The rabbit can take a good percentage of its food in Comfrey and if protein percentage is considered it will soon be seen that considerable reduction of costs can be effected.

Sheep and goats. Both of these animals can eat Comfrey green or dried to great benefit. By studying the analysis a producer can soon work out what additional carbohydrate and roughage to add to complete a satisfactory ration. Bear in mind that the properties of Comfrey will ensure that a larger percentage of the lambs and kids will survive.

Poultry. With poultry of all types Comfrey fresh or dried is readily acceptable and a real reducer of costs in feeds. It has been established that costs can be reduced by 25 to 33.3% depending on the seasonal changes to be expected in any crop production. With the health-giving properties of Comfrey, eliminating deaths especially from bacillary white diarrhoea which every poultry man dreads. Manure from the stock is the best fertiliser for high Comfrey production.

Horses. Comfrey is known to produce good bone structure and a glossy hide on horses. With this, as with a number of animals, horses find Comfrey in its fresh state to be an acquired taste. Dry, they will eat it without much trouble and once used to it will call for more and more in their diet.

Says Mr. Phillips about Comfrey: In general, planting material is provided by root and crown splits. Supplies are not available in large quantities and those people who have good named variety plants should husband their stock and ensure that increase in planting is one of their aims. To those who wish to try this crop it is suggested that a small planting be made and with a season's experience they can then decide if expansion is desired. It is to be emphasised that compost or manure is the best fertiliser for this plant and the quantities and quality of this can be effective in the crop reaped. Under good conditions, these being good deep loam or clay loam soil of 6-7ph with irrigation, and clean cultivation, 100 tons or more of green matter per acre per annum can be expected. The plant grows to perfection on the Rhodesian high veld and therefore can provide a source of protein other than the expensive and scarce importations.

Comfrey analysis (dry)

Amino acids: Lysine 1.41%, Metheonine 0.58%, Tryptophane 0.63%
Isoleucine 1.15%
Crude protein 34.6%, carbohydrates 30%, fibre 10%, the balance is made up of ash and oil.

from Rhodesian Farmer
May 2, 1975

Extract: **Letter from J.P. Phillips, Zimbabwe**
25 July 1991

I wonder if New Zealand has imposed any restrictions on it following the Neutze case, about which I have quite a lot to say. Firstly, that the Coroner's verdict was obviously a pre-determined opinion. Secondly, the police investigation would not be accepted by any coroner's court with such unsubstantiated evidence. Thirdly, how could a verdict be made attributing death to comfrey without a post-mortem examination followed by every possible test, before attempting to be the first to bring in such an unprecedented verdict. There are many more questions to be answered by the authorities in NZ if any attention is to be given to such a sweeping statement from their coroner. I must add one very outstanding point. If in any country it was very positively discovered that a general food was in fact dangerous and positive proof shown to have been given, would it not be accepted world-wide and the food prohibited by every government; i.e. to brand comfrey as a No. 1 poison along with such poisons as cyanide, etc. I cannot conceive of a government minister accepting from anyone, expert or doctor, such an unsubstantiated statement. And without the question, as you have noted, of divergent interests being examined.

That is what I had to contend with here with the stock-feed merchants and millers who had the ears of our experts. One of them (now dead) had a particular hate on Comfrey because his father had sponsored it, and after feeding his pigs, making public the fact that he

had enjoyed complete freedom from disease by supplying only a small quantiy of comfrey daily to his pigs. He had the smallest of plantings, having very little water to spare. I visited this man, who lived outside Bulawayo and saw his setup; I produced his letters to me to show his son, who exploded with anger when he saw the writing. That ended any chance I had with the Dept. of Research. I do think we suffer today with far too many "experts".

As far as the millers and stockfeed merchants were concerned, I started a pig farmer on comfrey and she was delighted with the health aspect first and the cost factor as well. Then a representative from the miller came on his annual visit. "You must never feed greens to pigs! We supply balanced rations with which you will produce the most acceptable pigs and how easy for you; simply feed the ration at the correct rate!" She, like others, was impressed by this, so the comfrey I had started was abandoned. The same story can be told on health, which I will explain in my next letter.

Extract: 8 September 1991

My wife is quite horrified at the story of the inquest on Neutze, seeing it as you and I see the glaring lack of investigation that the Coroner accepted. This story is only confirming your suspicions that vested interests have concocted a case to quote when lobbying MPs for support. I have made the following points which I feel should be emphasized greatly. 1. Since 1978 when the press announced the dangers of Comfrey and Australia placed it on their poisons list, no other country has followed suit. This is the most lethal of all points and should be driven home when stating our case. 2. The CSIR who were involved don't seem to have impressed their fellow members, none of whom have passed any legislation against the herb. 3. Vested interests: To those you have mentioned please add the grain producers, millers and stock feed merchants who style themselves as experts on feed, selling balanced rations, a very lucrative business. Remember Bromfield tells of his work in building up his cattle on natural lines by the introduction of alfalfa into pastures on the belief that ruminants in the natural state do not live on grain. So he cut his expense in feeding. But today forced feeding of grain with concentrates is standard

practice! This is the kind of expertise I encountered and the people who benefited from the system. Again I emphasize that no other country has followed suit in banning the plants and in two books I have recently received, published in 1990 and 1991, Comfrey is tabled, giving some details of its uses; so obviously the shattering news of a plant popularly used for food and medicine has not been accepted anywhere else as poison.

* * * * *

We are both using our comfrey—Elin as a drink by triturating green leaves in water, and I dry and mill leaves into powder, which I mix with cereal or soup each day. "

Extract: 25 November 1991

" Here I have several farmers showing interest especially as the drought has brought the cost of bought feed to prohibited amounts and scarcity. One of these farmers is now involved in crocodile production and finds the search for meat is becoming difficult so I suggested he do something about producing his own with pigs, or goats using comfrey as protein, a means of reducing costs, etc. Another farmer now growing his comfrey from cuttings from my stock has yet to show me the new stand and his figures of reduced costs. My plot now is in full flower since rain has fallen; a wonderful sight and grows so fast and lucious we cannot cut fast enough. My son-in-law has yet to use it for his cattle as it would be necessary to increase the planting considerably to be economical and with his other crops of Maize, Soya, Wheat and Tobacco he has his hands full. A herd of some 150 head take a great deal of time too. I don't know if you will be able to identify my comfrey from the petals of the flowers enclosed? I have always understood it is Webster's strain but would like to confirm that, so I could state positively if and when called upon to do so.

This plot we have here is planted very much closer than recommended and presents a solid block of green today with the older plants obviously very heavy. The effluent from the pigs is simply spread directly onto the plot and there is no evidence of nematode infestation.

I am familiar with the havoc nematodes can create in comfrey, as I planted years ago on tobacco land and lost most of that planting, the roots of the plants becoming a black mass. I did note however that amongst this black mass the plants were still making an effort at regrowth. I feel, with you, that this heavy manuring ensures the nematode has no chance to compete. It's quite remarkable, the evenness of the stand with no evidence of blank spaces. A sample taken today from one plant, cutting the leaves about 10 cm above the crown gave us a reading of 12 pounds. Not bad for plants just 12 months old. I am very pleased about this and now want to persuade my son-in-law to extend his plantings and provide for cattle and the dairy herd. "

The following chapters were written in 1966 and appeared in my first book "Miracle Grass, Comfrey", published that year in Japanese. In these 25 years since then, nothing has refuted the statements in these pages. The notes have been somewhat brought up to date and re-edited. The facts stand unassailed.

Miracle Grass, Comfrey

Comfrey for the Home Garden and Small Farm

p. 111 - 120

This is the place that Comfrey has traditionally filled in popular usage. To grasp the significance and value of the place it legitimately holds and has held for so many years we need to know something of its history and background.

Comfrey was often spoken of as "Russian Comfrey", a general name covering three main types, based on the fact that the two main types used for stockfood came from Czarist Russia to England; the first, Asperrimum (or Asperum), about 200 years ago, and the second, Peregrinum (Uplandicum) about 100 years later, coming from the Caucasus mountains.

Symphytum Peregrinum

It is this second type, an F1 hybrid between the earlier Asperrimum and Officinale, the common Comfrey, that we are concerned with, the

remarkable characteristics of this best of all Comfreys, Symphytum Peregrinum, and especially two particular clones of this species, classified as Nos. 4 and 14.

This classification and selection lies behind the phenomenal records of production and quality. But unless this process of observation and selection, with elimination of weaker plants, is continued in the propagation and spread of Comfrey, the species can easily deteriorate. We have seen this happen, with people buying a few offsets, growing them, and then indiscriminately cutting roots and selling them to others with a quick-money-making plan, a trap for the unwary.

The reason for the need for continual observation is that Peregrinum, the best of the Comfreys, is an F1 hybrid, and succeeding generations of this plant show reversions and variations that must be constantly checked and eliminated if the best results are to be maintained. These clonal variations were classified by Lawrence Hills of the Henry Doubleday Research Association; but minor differences are not significant to the average commercial grower or farmer. The only matters of real concern are 1) quantity yield in terms of green leaf, 2) quality yield in terms of chemical analysis, food value and palatability, points that are affected greatly by the method of cultivation and soil treatment. Plants that do not measure up to certain standards must be eliminated, as we will make clear. Neglect, chance cross pollination, propagation from 2nd class plants are points to be watched, and what we set out here can be a guide to the wise selection and growing and use of this extraordinary plant, concentrating on one type of Comfrey—the F1 hybrid, Symphytum Peregrinum.

Rate of Growth

One of the truly astonishing facts about Comfrey is its rate of growth. Leaves of a mature plant grow to 90 cm long and 20-25 cm wide in 28 days at the height of the season, if cultivated properly in the right location. This means 3 cm a day, almost a Jack and the Beanstalk story. Our experience in Japan confirms what has been done in England, Australia, Canada, New Zealand and Kenya in yield per acre.

Cut every 28 days (which means cut off completely, large and small

leaves, about 2-3 cm above the ground) one can get 4 l/2kg of green leaf from well-established plants at each cut in the main growing season if properly cultivated. Three kilograms is a fair average yield, and depending on soil treatment this can be raised to the optimum. For highest protein content, plants should be cut every 21 days, thus increasing the yield and raising the number of cuts in one year from 8 or 10 to 13 or 14, depending on the season and the location of the plantation. But the soil must be properly conditioned to get such results.

Comfrey is a permanent plant, so a site for a farm plot must be chosen where it can remain for a lifetime. There are places in England where the same Comfrey plants have been growing in the same place for more than 40 years. But there is no need to leave the inter-row soil idle in the cold winter, when Comfrey is dormant, if a crop of cabbage or other quick growing winter plants are needed.

Adaptability to Climate—Experience in Japan

Realizing that the original Symphytum Peregrinum comes from the cold Caucasus mountains, one is not surprised to learn that it has adapted very well to the cold climate even of Hokkaido, with a growing season of some 5 months at most, and has survived through the deep winter freeze to a depth of 20 cm and more, where the snow lies deep for five or six months. In the mountains of Nagano too, Comfrey has done exceptionally well, giving six or eight monthly cuts, and yielding what must be classed as among the finest Comfrey in the world. This climate of Nagano yields 15-20 tons of green leaf per 10 are, about the same yield as in England. Comfrey enjoys the climate of Nagano, some 800 meters above sea level.

By contrast, in warm temperate zones, the yield goes up to 25-30 tons per 10 are, so that in Australia (Southern Victoria) and Northern New Zealand it produces the phenomenal 100 tons to the acre, while in warm and sunny Kenya it has recorded 142 tons to the acre (35,000 kg from 10 are).

We hope some day to learn that Comfrey is helping to relieve the deep hunger of the vast populations of the Asian tropical and sub-

tropical regions.

The adaptability of Comfrey to a wide range of climate is without question, and it will grow where that other miracle plant of agriculture, Alfalfa, will not grow. It also has a longer season, and higher food value, so in the world's need for more high protein food it has a great role to play, as we have found in Japan, adapting to the wide range of climate from Northern Hokkaido to Kagoshima, and even Okinawa.

Deep in the Soil

Comfrey shares with Alfalfa the distinction of being one of the deep rooted fodder plants. It does not go as deep as Alfalfa, but it needs when mature to be able to get down into the subsoil. This is one secret of its success on mountain sides and high lands; it does not do well on low lying areas where drainage is not good.

It is only when the main roots get down to the subsoil that the plant reaches its maximum in food value, in vigor of growth and palatability, because here lie the rich microelements that have leached down through the top soil. Only the deep growing main roots can reach these. This is one of the secrets of Alfalfa too. And with the depth of root comes resistance to disease and insect pests.

Palatability

Some strange things have been written about cows not liking Comfrey. This has been tested in many countries, and we have personally tested it. We can say that not once have stock really refused Comfrey, though sometimes they have hesitated at first, as we do with a new food taste. But when one considers the way cows are fed on some farms, expected to survive on second grade concentrates that ruin the health of the stock and can never yield good results, one is led to the conclusion that the introduction of Comfrey would be like a birthday treat that cows would want to celebrate with a song and dance.

Cows are grass eating animals. They eat selectively, guided by their noses. They should always have a choice of foods, and they themselves know what their bodies need.

After attending the First World Comfrey Conference in Portland, Oregon, we visited a nearby farm where the farmer had a well-established crop of Comfrey growing on an allotment (upwards of an acre) enclosed by an electric fence.

When the farmer cut the long deep green leaves of Comfrey and called his cows, they came running to get their daily ration. They were not a hungry half-starved herd; they were really fat stock. But clearly they knew and relished their Comfrey rations. The free range method of grazing grass and Comfrey selectively has shown that cows will eat out the Comfrey first, right down to the ground, and pigs will not only eat the leaves but root out the plants as deep as their noses can take them if allowed to do so.

Our noses are not as efficient as theirs but it is interesting to note that on the palatability of Comfrey no one—repeat—no one we have yet met has disliked it. All have found it palatable, either as green leaf cooked for eating or powder made from the dried leaf, or as tea powder used like Japanese green tea in the tea ceremony.

Some have looked at the hairy stems, and felt the roughness and wondered at eating it. But the cow's instincts are better than ours and their tongues are rough and strong. Their food instincts tell them what only the microscope and modern chemistry have taught us, that the hairs on the Comfrey stems and leaves contain Vitamin B12, and so richly that a serving of Comfrey eaten like spinach will give you as much Vitamin B12 as a serving of calf liver. Cows and pigs and chickens know this by instinct. How much wiser they are! The hairiest of the Comfreys is Asperrimum, but stock even like that too, but for Peregrinum, they take to it readily when given free selection, and look for more. Even baby pigs and chickens eat it readily in preference to other greens.

Yield and Food Value

We have set out what can be expected under good cultivation methods in various climates, but in dealing with yield there are a number of factors that need to be taken into consideration. One of the major problems of the agronomist is to shorten the time required in the

crop cycle. By standard methods and standard crops it is possible to take one crop of rice from average land in one season. In some places it is possible to reap two crops. But it has been calculated that the maximum quantity of nitrogen that any agrotype can absorb from one acre is 318 lbs (about 36 kg per 10 are of crop). This is the limiting factor in production. The search goes on constantly for faster maturing types of crops, to step up this rate of conversion of nitrogen from soil to mature plant.

In Comfrey this speeding up process reaches its optimum. By cutting mature leaves every 20-28 days the plant is kept in a constant process of nitrogen absorption for 6 or 8 or 10 months of the year, and the rate of take-up of nitrogen continues, reaching its peak in the middle of summer and early autumn.

To every farmer producing grain or hay or milk or meat, the quantity of first grade food to be obtained from one acre is a major question. On this the whole economy and prosperity of the farm will depend. In one of his most famous lectures, "Life from the Soil", Sir Stanton Hicks cites a high level of production in the USA.

"From one acre of wheat, followed by a crop of Sudan grass, on one farm in the American Middle West, seven tons of wheaten and grass hay were garnered. This hay contained 4,000 lbs (1,820kg, or 452kg from 1/4 acre) of protein together with a corresponding quantity of carbohydrate, and could be converted into 2,600 gallons of milk (650 gallons from 1/4 acre) or 1,890 lbs (about 900 kg or 225kg from 1/4 acre) of veal. In stock-raising value this protein-rich hay is equivalent to 233 bushels of wheat (about 14,000 lbs, 6,363kg or 1,591kg from a quarter acre) ‖

This is considered a high rate of production. But now let us make a comparative analysis of production of Comfrey from one acre. For the sake of our Japanese readers we reduce the figures to 1/4 acre (about 1 tan, approx. 10 are).

We present three tables of figures. The figures in Chart No. 1 are from the Ministry of Agriculture, Great Britain, giving the relative food

Table 1
COMPARATIVE ANALYSIS OF VARIOUS STOCKFOODS
(Source: Ministry of Agriculture, U.K.)
(Unit: %)

	Protein	Fiber	Carbohydrate	Oil	Ash	Total Dry Matter
Soya Beans (Whole)	33.20	4.10	30.50	17.50	3.40	90.00
Groundnut (Peanut) Meal (Extracted)	31.80	25.30	29.10	1.90	4.30	92.40
Good Dried Grass Meal	20.30	14.00	41.90	5.80	8.00	90.00
Lentils	25.50	3.40	52.20	1.90	3.00	86.00
Lucerne Leaf Meal (American)	31.40	24.50	40.60	1.90	10.20	91.00
Very Good Red Clover Hay	15.30	22.20	35.80	3.20	7.00	83.50
Comfrey						
Average May 1954 (Sun Dried on Roof)	26.37	7.15	36.72	1.69	13.12	84.88
Average Aug. 1954 (Sun Dried on Roof)	22.25	11.07	34.73	0.97	15.14	84.40
Best of 48 samples (Sun Dried on Rack)	33.68	9.36	32.23	2.13	14.89	92.27

values of various standard stockfoods compared with three samples of Comfrey. The figures of Table 2b are from leaf cut in May, the early season cutting giving generally the highest protein analysis. This is the highest known analysis of mature Comfrey leaf and comes from the farm of a champion veteran grower in England, Mrs. P.B. Greer. It should be noted that Mrs. Greer's Comfrey is the same strain as that imported into Japan, and all top records of production and analysis are from this type in Australia, New Zealand and Kenya.

It is clear from these Tables that Comfrey is unrivaled as a stock-food, for not only is the food value so high, but the versatility of the food, the long growing season, the permanent nature of the crop, the ease of handling, the adaptability to climate and its high therapeutic value put it in a class by itself.

Look now at Table 2, (a) and (b). Table (a) sets out the various averages of Comfrey production (Green leaf) in various parts of the

← Miracle Grass →

Table 2 (a)
Average

Green Leaf Per 1/4 acre (1 tan)	Dried to abt 13% Moisture (atmospheric)	Protein 26%	Carbohydrate 36.7%
(Average, England)			
15,000 kg	2,310 kg	610 kg	763 kg
(Best, England)			
20,000	3,080	813	1,018
(Aust. & New Zealand)			
30,000	4,625	1,220	1,527
(Kenya)			
35,000	5,400	1,425	1,780

Table 2 (b)
Optimum

Green Leaf Per 1/4 acre (1 tan)	Dried to abt 13% Moisture (atmospheric)	Protein 33.3%	Carbohydrate 32%
(Average, England)			
15,000 kg	2,310 kg	763 kg	750 kg
(Best, England)			
20,000	3,080	1,018	1,000
(Aust. & New Zealand)			
30,000	4,625	1,528	1,500
(Kenya)			
35,000	5,400	1,783	1,758

world and different climatic conditions. The values of the dry leaf are converted into Protein and Carbohydrate. Table (b) shows the values of optimum leaf. (Figures have been approximated for easy comparison.)

Compare these figures with those quoted on production in the USA middle west of Wheaten and Grass Hay. It will readily be seen that Comfrey stands far above even this high level of standard farm produce. Even at the low figures of the cold climate of England with its 15,000kg per 1/4 acre, the food value of average Comfrey yield

exceeds even the highest production figures of standard crops.

When you come to top-level production of Comfrey, say (for example) what can be regarded as standard production in temperate zones, such as southern Kanto, Shikoku and Kyushu in Japan, where 20-30,000kg of green leaf can be harvested from each 10 are, and at highest protein 28-33%, you have well over 1,000kg of protein and the same quantity of carbohydrate, reaching a potential 1,500-1,700kg of each per quarter acre.

What other plant can compare with this? It is easy to see from these figures what an amazing food factory Comfrey is. It is actually the Comfrey that does the conversion, taking from the soil the rich nutrients the farmer must feed to the plant, and in cooperation with the sunlight giving back to man up to 1,783kg of protein and 1,758kg of carbohydrates per ten are, plus the red blood-giving Vitamin B12 and the healing power of Allantoin.

Insect and Virus Resistance

Symphytum Asperrimum and Symphytum Peregrinum (Father and child) appear to share the high degree of resistance to these two enemies of the farmer, virus and insect. But Officinale is one type cultivated for stock and for medicine that suffers from one of the virus diseases, and lacks something of the vitality of the other two.

Like Alfalfa when the roots get down into the subsoil and begin to feed on the micro-elements, the resistance of Comfrey is strongest when mature. This is clear, that Comfrey does not need spraying to keep off insect pests, and it is free from virus attack.

Comfrey will do well only in soil that is rich in humus, rich in active aerobic bacteria, fungi and micro elements. It does not like artificial fertilizers, and these should be used if ever, only with the greatest care. To do well it must find Vitamin B12 in the soil, and this will be there only if it has the right conditions for its production.

Comfrey is hungry for nitrogen; it is rich in potash; it likes a slightly alkaline soil at pH 7.2 and loves rich compost. Given these conditions

you can produce top grade Comfrey all the year round where the soil temperature is above 10°C.

End- 'Miracle Grass, Comfrey'

With this introduction to this wonderful gift of nature we turn now to the background story to find out how this age-old friend of mankind had been known, lost, and found again.

Comfrey Encircles The Globe

What are the forces of circumstance that make even a chance word significant, setting in motion a vast and valuable chain reaction? When I came to Japan in 1957 I little thought that Comfrey was to become a matter of major importance to Japanese agriculture. I didn't plan it that way. But circumstances provide the opportunities if we are ready to move in.

Looking back over my notes I find that the first leaves from our first plantation were cut on June 29, some 10 weeks after planting, the longest leaves being 68cm long and 23cm wide. The total cut of all leaves of two of the largest plants weighed 2kg each. The roots had already reached down more than 40cm into the soil. This was sensational. We estimated the yield would be about 1,000kg from 1 tan (1/4 acre) from plants that less than 3 months before had been mere root sections, 8-10cm long and 1cm wide. Every root had struck, 100% fertility, and the vigor of the plants was phenomenal. Each plant had been given 10kg of ordinary farm cow manure compost. We cut again on July 27. This time the biggest leaves were 80cm long and the best plants gave 2 1/2kg of leaves. We estimated that a full cut would represent about 1,300kg of green leaf from 1 tan (1/4 acre) a very exciting result, and full of promise. What was the secret of this amazing plant's vigor?

In July 1962, Agricultural World (Sekai) published an article written by me, which marked a high point in the place of importance Comfrey was beginning to assume in Japanese agriculture, as this meant that it was OK'd by those who spoke with authority on agricultural matters.

Back in 1960 when the story of the successful development of Comfrey in Japan became known, our knowledge of Comfrey was rather sketchy, based on our limited experience with the plant in Australia, the reading of a number of reports and so on. Our real study of the plant began then. What are its secrets, we asked.

The search for authoritative literature locally was mostly unrewarding. We found that the only source of reliable information was the Henry Doubleday Research Association. A visit to England in 1961 provided the opportunity and opened up new fields of understanding on both Comfrey and the related fields of organic agriculture, the micro elements, soil fertility, etc.

It was interesting to find that the new information took me back to earlier studies done on these subjects, studies that we had begun in India in 1926, and which came to new developments in Australia in 10 years of experiment followed by 10 years of practical farming, where some of the theories were put to the test.

It is not surprising to find that little is known about Comfrey. The new era of Comfrey growing began only in the post-war years from about 1948, the result of the work of the Henry Doubleday Research Association and under its guidance. The name of the Association perpetuates the memory of the greatest single contributor to the Comfrey story, Henry Doubleday, who 100 years earlier had introduced the most valuable of the Comfreys, Symphytum Peregrinum, into English agriculture.

Significance of the Names

The history and value of Comfrey is written in its various names. Comfrey is the popular name of a wide variety of members of the borage family or borage-worts. The name is best known with the variety called Officinale which is the Common Comfrey of Europe and North America. The name Comfrey however has special significance. It comes from the old French confirie or confiere, meaning to heal or preserve, and shows the value placed on this old-time remedy in popular usage. For anyone now (as one organization in Japan has done) to say that their Officinale is not Comfrey would be like denying that

the common alley cat is a cat. Officinale is the mother of all Comfreys.

Symphytum. This name is also medically significant and goes back some 2,000 years of Greek knowledge of healing herbs. It is the basic name of the species, and comes from the Greek Syumphuton which indicates it has the faculty of gluing together or binding. The plant is recorded by Dioscorides, an officer in the Greek army, the equivalent of today's surgeon-general, and he refers to the fact that this particular plant was used to stop bleeding and heal wounds. It appears in his Materia Medica, written in the first century A.D.

Officinale. The treasure house of knowledge, and the source of physical and spiritual healing in Europe for many centuries was the monastery and such religious institutions of learning; the store room where the medical herbs were kept, the plants and drugs, etc. was the Officina and the name of common Comfrey comes from this interesting and significant fact of history. And for those interested in tracing its medical history we can add that the Comfreys and their healing powers are recorded in the Pharmacopoeias of various countries as follows: Belgium, Radix (root) Symphyte; France, Consonde; Mexico, Sinfito; Portugal, Consolida Major; Spain, Sinfito Major. All names suggest making sound or well, binding or healing.

Comfrey Comes to England

Asperimum (Donn) or Asperum. This was the earliest type imported into Britain and its history goes back there to the late 18th Century. A nurseryman and gardener named Joseph Busch went to St. Petersburg (now Leningrad) to work in the garden of Empress Catherine the Great of Russia. Between 1790 and 1800 he sent back to England several Symphytums for garden plants, to be used as showy border plants producing their beautiful bell-like flowers and growing up to 4-5 feet high (120-150cm). In 1812 the Symphytums were listed and catalogued for sale in England, a total of seven being available at that time. One of these was identified later by reference to botanical magazines as Symphytum Asperrimum, the name later being changed and adopted by some as Aspernum, but not generally used. The name Asperrimum means the roughest and this type was popularly known as Prickly Comfrey. It was described as native of the Caucasus, the largest of the

genus growing to 5 ft high (1.53m). Its flowers were vivid blue.

In 1810 another nurseryman discovered the value of Asperimum as a fodder plant, claiming a yield of 40-60 tons per acre, 10,000-15,000kg per 1/4 acre obtained by frequent cutting. During the next 40-50 years the plant became well known and widely used, and largely displaced Officinale, which had been commonly and widely used before that time, but which had not produced the same quantities of leaf for stockfood.

Right through until 1870 the Comfreys, both Officinale and Asperrimum, enjoyed wide popularity, and were subjected to the first chemical analysis and scientific report. The type, plus methods of cultivation of Asperimum for stockfood, and infrequent cutting gave nothing more than 40-60 tons to the acre; it was well liked by stock in spite of its very rough leaves and stems. The yield was not phenomenal when one looks at the later results, though 10-15,000kg per 1/4 acre was good compared with other fodder. It was not until 1875 and onwards that the records began to rise.

The Second Immigration to England

Symphytum Peregrinum. Reports at this stage of Comfrey growing came from Henry Doubleday, a small farmer and keen experimenter living in Essex, England. He imported a new Comfrey from St. Petersburg (Leningrad) a new species which came from the Caucasus, 4,000 ft (some 1,000m) above sea level. This is now recognized as a hybrid obtained from a cross between Officinale and Asperrimum, and is also known by the name S X Uplandicum, the name indicating its natural location up in the hills.

The illustration of this Comfrey facing page (see back cover) is taken from a botanical magazine of 1879. It was drawn by Thomas Christy, a writer, botanist and nursery-man, a member of the Linnean Society, and close friend of Henry Doubleday who, though he did not use the letters F.R.S. after his name, was a fellow of the Royal Society, a high scientific honor in Great Britain. These two men, Christy and Doubleday, gave the plant the name Russian Comfrey to distinguish this new Comfrey from the then popular Asperrimum, which it most closely

resembled.

This new type reached 6'8" in height (over 2 meters) when allowed to flower, and was carefully chosen for its various superior characteristics by Henry Doubleday. It was from this plant that the highest yields of that time were obtained in England, recording 100 tons per acre (25,000kg per 1/4 acre).

From 1875-1900 Comfrey boomed, though little was done to carefully classify the types, with the result that many poor types were oversold on the basis of false claims made by get-rich-quick salesmen, somewhat like what happened in Japan over the few years after 1960, but with this difference, that the only basic type of Comfrey imported into Japan is Peregrinum, so its lesser parents, Officinale and Asperrimum were not there to compete. We need to say something of the modern history of Comfrey to briefly indicate the world-wide developments that have taken place since 1950, and the part played in this by Japan since we introduced it in 1958.

From about the beginning of this century, Comfrey disappeared relatively from sight, except for those devoted adherents who continued to grow it for their own use. It is on these people that the modern expansion depended, and when the revival began under the initiative of Lawrence D. Hills of the Henry Doubleday Research Association about 1950, high quality plantations were found that have produced Comfrey for a generation and more from the same plants.

The decline in interest in Comfrey belongs to the period of the development of artificial fertilizers, and many new discoveries in agricultural science. Grassland farming turned to the increase and improvement of pastures by the wider use of legumes, and the principle of crop-rotation, or ley farming, was strongly emphasized. Comfrey, which is in the nature of a permanent crop, and does not like chemical fertilizers, was forgotten except for special applications such as had to do with the health of stock. Many people still bought small lots for private use, but research into type, better yields, and wider application ceased. Many crops of Comfrey were neglected, and in some cases by self-seeding with such types as Officinale which pollinates more readily than the other two, and by accidental pollination with other base types,

(right)
Clone No.4
Started in pots.

(below)
Comfrey cut for
Fat Cattle at
Portland, Oregon,
USA. at time of
First World
Comfrey Conf.

many Comfrey plants lived on, merely as ornamental and neglected weeds of doubtful value.

The first report that set out to give details of contemporary produc-

tion, and to recover from past records the details of Comfrey production and types that did so well in the later 19th Century was published in 1955 by the H.D.R.A., and expansion overseas belongs to about the same period, having started in 1953 when the first lot went to the African Continent.

A well-established No. 14 clone, showing quick recovery [14 days] after cutting just above ground level. [at Shimoda, Japan]

Space will not permit the full story of the spread of Comfrey through the world nor the details of English research, but one must mention such places as Kenya, Australia, New Zealand and Canada, where new records have been established and production has reached a high level. Comfrey in these places has proved itself to be a wonder crop through these past years.

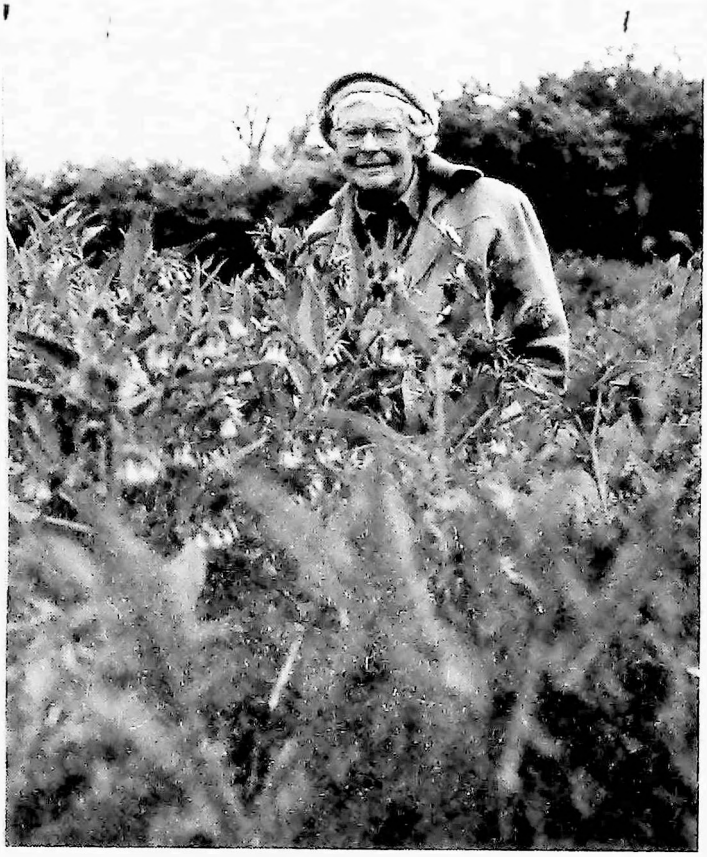
My part in the story began in Japan, because the coming of Comfrey to Japan began the next stage of its expansion and use as stockfood and then as a medicinal herb, as related in an earlier chapter. Comfrey went to both India and Ceylon from Japan. It has often been claimed from earlier failures that Comfrey is not suitable to the tropics. Kenya has shown that it does exceptionally well in hot sub-tropical regions. But

Comfrey fields in Spain. Fed to cattle, sheep and horses.

India and Ceylon have yet to demonstrate that in the hills of these tropical countries it could produce great quantities of high grade protein to feed the growing population, especially that of India, where so many millions of people live at bare subsistence level, and it could be of special value to those who for religious reasons subsist on a vegetarian diet.

I suspect that Comfrey really lacks one dedicated person in each of these places to grow it. I think of places I know in India in the northern hills, in the Western Ghats, and in the Nilgiris of the South, where conditions can be found not so dissimilar from Comfrey's natural or adopted habitat.

Our first boom in Comfrey growing and usage came through 1961, and continued to move upward through 1962. More and more farmers were reading about Comfrey, mainly from articles which Doi-san and I wrote for various agricultural journals. Animal Husbandry published an important article in Aug. 1961, following closely on the March article in the magazine, Asahi Glass, of the same year.



Mrs. P.B. Greer at 82. Former Principal of Holmes Chapel Agricultural College. Looking over Comfrey plants in bloom.

So great and growing was the interest that it became necessary to import more offsets from Australia and England. In the spring of 1962 we obtained further supplies from Foster Savage of Australia, and also sent for a large quantity of offsets from one original source for all supplies, a champion grower in England, Mrs. P.B. Greer. Mrs. Greer's farm was in Essex, the same county where Henry Doubleday had grown his Comfrey and where the experimental research farm of H.D.R.A. was then located. It was from this farm that most of the champion stock of Comfrey offsets went overseas, the Australian Comfrey, the Kenya Comfrey, the New Zealand Comfrey, all Webster's Giant strain of Symphytum Peregrinum. May we here pay a tribute to

this veteran Comfrey grower, whose Comfrey hay gave the top quality yield shown in the statistical tables given on pp. 117, 118. Mrs. Greer, then over 80 years of age, still active and keen, was formerly principal of Holmes Chapel Agricultural College.

A brief quotation from what she had written about Comfrey helped us in view of Japan's growing uses of Comfrey, and some of the stupid things which some self-styled experts had written about Comfrey.

Mrs. Greer writes, "Comfrey is also excellent fodder for hens. Young pigs will eat it from their second week, and I feed my older pigs first with Comfrey, as much as they will eat, and then feed them a lesser amount of concentrates. All farm animals eat Comfrey with relish". And she adds, "Artificial fertilizer always reduces quality, even if it increases quantity...and it is quality that counts most".

Another step of great value to Japanese agricultural science was taken early in 1962. By the courtesy of the H.D.R.A. we imported about 20 varieties (clones) of Comfrey and gave them to the Department of Agriculture of Japan for experimental work and research.

It was no surprise to find that the Department had known nothing about Comfrey until our article and reports were published in 1961. On my various interviews with the departmental officers concerned, especially the Farm Grown Stockfood (Stock Maintenance) division, it became clear that Comfrey was likely to prove a sensational improvement to the stock raising industry of Japan. It would make a major contribution to the problem of home grown, farm grown, Japan grown stockfood: Just the kind of plant Japan urgently needed at this time for its rapidly expanding stock raising industry in the nation-wide movement away from a rice oriented regime to higher protein food production.

Gradually the story was becoming known. Dairy farm magazines, poultry magazines, the stockfood industry magazines all took up the story, and Doi-san's farm became almost a place of pilgrimage for farmers from all over Japan. Students of agricultural colleges were brought on investigation excursions, and the fame of Comfrey spread. In April 1962 the Dairyman published a fine article, with an interview

with Doi-san, and many excellent photos.

The interest was so great and the need for accurate information so urgent that Doi-san and I formed a Japan Comfrey Growers Association, and published our first Bulletin in June 1962, followed by two other issues in 1962-3. Our object was to give the most recent and accurate information freely for the benefit of growers and users. So, sparing neither time nor effort nor money we set about the task of writing articles, corresponding with people all over Japan and abroad, and telling the story of the value of this remarkable plant.

If at times it was a little annoying, and often amusing, it was certainly not surprising that many people began plagiarizing our work, without even acknowledging that their information came from our writings, and their offsets which they then offered to sell at high prices came from Doi-san's original plantation of this sensational plant. They owed everything to the work we had done.

One would think sometimes, to read their statements, that they were the discoverers or inventors of Comfrey! They were merely quick witted enough to capitalize on our work.

But we proceeded with the important job of spreading the knowledge and beginning a new stage of research. The year 1962 saw the beginning of research in Japan into the Vitamin B12 content of Comfrey at the Hokkaido University and into the problem of nematode control.

Good reports on Comfrey growing and use came in from an Agricultural Promotion Society in Hokkaido, from the Kyodo Milk Production Co. of Nagano, and then the most important report of that year, a complete report on test feeding of Comfrey to dairy cows, the test conducted by and the report published by the Meiji Milk Producing Co. of Nagano Pref. on Sept. 1, 1962.

We translated this most valuable report into English and sent it to H.D.R.A. in England. It was then printed by the Association and circulated to all H.D.R.A. members throughout the world. Officially it is No.3 Comfrey Report.

These details of the work of the H.D.R.A., of which I am a life member, indicate the purpose of our major work with Comfrey, and illustrate the value of a research organization that is dedicated to the work of improving farming techniques and discovering and disseminating the truth.

Other significant developments in 1962 included the completion of Comfrey's encirclement of the globe. Starting 200 years ago from St. Petersburg, it moved to England, where it settled down in quiet English respectability. One hundred years ago the migration began again, from the Caucasus to St. Petersburg to England: A second wave, and again it settled down. But World War II, which shook the world to its very foundations, set the movement going again. It was shortly after the war that it revived like Rip Van Winkle and moved across the vastly changed world.

Within two years after reaching Australia it came to Japan, and four years later, it went back to Moscow. The Soviet Embassy in Tokyo, alert to what was happening in Japan, saw the articles in the various Japanese agricultural journals, and in Nov. 1962, a Mr. Ivanovich, a visitor from Moscow who came from the Soviet Embassy visited Doi-san's farm to investigate this new wonder, called Russian Comfrey. He obtained offsets and sent or took them back with him.

The Bulgarian Embassy did the same. And another excellent development that took place was the result of a visit to Japan of an agricultural expert from Romania, Dr. N. Hulpoi, who became interested in Comfrey, and agreed to undertake research in his institute in Bucharest. We supplied him with Comfrey and Comfrey information.

We may add without undue pride, but at least with the feeling of satisfaction that we are continuing the tradition of the Henry Doubleday Research Association, that all these extensions from Japan, the correspondence and mailing and even in many cases the supply of offsets were done by the Japan Comfrey Growers Association, or out of the pocket of the writer. By November 1962 Comfrey had gone from Japan to nine other countries.

A major step forward in Comfrey in Japan came at the end of 1962

and beginning of 1963. This period saw the expansion of Comfrey in Japan to the field of health. We had written extensively on its healing properties, its original historical role as a herb, and now we found that some people working in the fields of health foods, natural foods, medical herbs, organic agriculture and related interests had begun to experiment with Comfrey. It is also important to note here that Japan was then and still is in a stage of rediscovery of ancient and well tried herbs. Kuko (Boxthorn), Sasa Kuralensis (a special type of bamboo grass), Korean Jinseng (carrot), the value of Cabbage, Kale, etc., these were all in favor to help the health of the people, so it was not surprising that Comfrey should awaken interest for its medical value.

So began the latest stage of an adventure which began in 1958, and the end of which it is not even possible to guess. In this new phase we picked up again some of the work begun long years before, some that had begun as far back as 1930, some details of which I have already recorded. A new world of adventure in living opened up. The story of micro-elements, the story of soil fungi, the story of the battle with nature that every farmer and in fact everyone who comes close to the earth is engaged in—the story of man's struggle for mental, physical and spiritual health and vitality, all these related subjects were opened up again. And it moved right into the field of agricultural chemical poisoning at the time when Rachel Carson's book, Silent Spring, hit the headlines.

Varieties of Comfrey

One of the major problems to be faced in trying to understand Comfrey, either for the layman, the farmer, the specialist, the agriculturalist, the botanist or the chemist, lies in the lack of accurate scientific reports, even in the various encyclopedias of the world. This is largely due to the fact that for nearly the first half of this century, 1900-1950, very little research was done on Comfrey and the relationship between the various known types. It is not surprising then to find that many misleading and inaccurate statements have been published because people have gone to their encyclopedias to get information and

found as I found, when in 1960 I began the same local search for knowledge, that all known reference books contain nothing really important to guide in the understanding of Comfrey, nor do they give any clear indication of the value and relationship of the various types.

One report says, "There are approximately 100 genera and 1,000 species of this family of plants, and according to the Encyclopedia Britannica, of little economic value."

One Encyclopedia says: "The genus includes some 25 species of herbs, native of Europe, Asia Minor, Siberia and Iran. Symphytum Officinale, or common Comfrey, is naturalized in much of North America, being a perennial with a stout root, stems about 3 feet high, and large, coarse, hairy leaves, and is sometimes cultivated for border flowers. Symphytum Asperrimum is not widely distributed in U.S.A., but in the Caucasus is reportedly cultivated for fodder, while Sym. Off. according to one authority is cultivated in New Zealand for fodder. Apparently the genus was introduced into England in 1811 for ornamental usage, but was soon adopted for fodder and produced enormous crops."

Just recently there appeared in the authoritative Animal Husbandry (July 1964) a series of 4 beautiful photos of Comfrey, growing in Japan. The Department of Agriculture has this stand (sample lot) of Comfrey growing for experimental purposes, and there is an accompanying text purporting to tell some brief facts about Comfrey.

Animal Husbandry published their first article on Comfrey in the August 1961 issue, using material supplied by me and Doi-san from our various articles and interviews. This was an important point in the first Comfrey boom in Japan, already referred to.

This new brief article in the July 1963 issue does not reach the same level of accuracy. Nor does it do justice to the story of Comfrey. In the first place we need to remind both the Department of Agriculture and Animal Husbandry that these very plants photographed were imported by me, the writer, at my own cost, sent by the Henry Doubleday Research Association in the interests of scientific investigation, and supplied free of charge to the Department of Agriculture, a total of 19

variations of two types which had been carefully selected and classified by Lawrence Hills, and constitute part of the only such classification undertaken anywhere.

It is also necessary to point out that the details accompanying the recent photos in Animal Husbandry are quite inadequate, inaccurate and misleading. The plants in the photos are named Symphytum Peregrinum according to the text on the reverse of the photos, and the text goes on to say the plant has red, purple and white flowers. Actually the offsets supplied to the Department of Agriculture contained two main species, Officinale and Peregrinum, respectively Common Comfrey and the F1 Hybrid. Common Comfrey or Officinale has red and white flowers, and one rare variant of Officinale (Officinale, Patens) has dull purple flowers, the true type of which can be determined only by examination of other points of identification. But the main type of the hybrid Peregrinum has Magenta colored flowers fading to Bishops Violet, 34/3 according to the color chart.

There are two main strains of Symphytum Peregrinum grown in England— Stephenson's and Webster's Giant. These have been classified into some 20 types, natural clones. The commercial name, Websters Giant, is the strain that produces the highest quality and yield of Comfrey, and is the type that has been exported to Kenya, Australia, New Zealand and Japan. There are minor variations in the Websters Giant strain, but about 60% to 80% of this strain is made up of what has been classified as Bocking No. 4 and the variations that occur in the balance are not necessarily significant, but need nevertheless to be observed by the specialist.

All this information, with the characteristics of the variations (clones) was supplied by me to the Department of Agriculture. The data accompanying the photos also errs in saying Comfrey came to Japan about 1955. Accuracy calls for the correct date, April 1958. The article says Comfrey became popular in the Caucasus at the beginning of the 19th Century, obviously quoting from one inaccurate encyclopedia which I had used earlier. Asperrimum belongs to the late 18th Century, and Peregrinum to the late 19th Century, and as far as is known, was never popular in the Caucasus. It was this improved type (the hybrid) that came to England in the late 19th Century. One can pass over the

rest of the data supplied, except for the oft-repeated statement "milk cows don't like Comfrey very much". We deal with that question elsewhere.

In dealing with the history of Comfrey we have indicated the three main types of Comfrey in common use. But there is need here to once and for all set out the basic differences so that botanist, agriculturist and the practical grower, either farmer or domestic gardener may be able to judge what is and what is not the best Comfrey. We are only concerned with the best—that is the best clone of Symphytum Peregrinum.

Why was it chosen? What are its specific characteristics as distinct from the general characteristics of Comfrey? On what basis can the right type be selected and poorer types be eliminated. We say "selected" even though there is basically only one type on commercial sale in Japan. Comfrey must still be "selected".

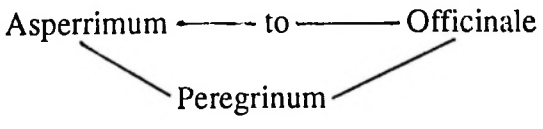
This one strain can vary very greatly, as can any hybrid. And because Comfrey is a permanent crop, and the grower will want to go on growing the same plant year after year in the same place and will want to get optimum results, we want to give a clear guide on how to choose the plant to keep and how to judge for the elimination of sub-standard plants.

It is necessary therefore to look more closely at the history of the three main types in medical, home and farm use, and see how Symphytum Peregrinum, Ledeb, Order Boraginacea, came to be selected, and how it has survived the years of obscurity.

History

Peregrinum

The period of the development of this hybrid plant is lost somewhere in the years between 1840-1870, but it has been established that it is a first cross — an F1 Hybrid between



When Peregrinum was introduced into England by Henry Doubleday somewhere about 1870 from St Petersburg, with its place of origin established as the Caucasus, it created a sensation by far outproducing both Asperrimum and Officinale, which until then had been in fairly common use. Asperrimum, which had been introduced into England about 100 years before Peregrinum, had far outpaced Officinale, and was the type mainly being grown for fodder.

Peregrinum then proceeded to displace Asperrimum, but not completely and much confusion arose. Unfortunately, most of Doubleday's research work of 30 years was destroyed, but his associate, Christy, on whom we depend for drawings and writings, clearly identified this new wonder plant which they named Russian Comfrey to identify it.

To get a clear picture of the development as well as the difficulties associated with the story of Comfrey we quote from Comfrey Report No. 1 published in 1955 by the H.D.R.A.

"The work of Professor K.V. Braid at the West of Scotland Agricultural College, and Dr. P.J. Watson of the Scottish Plant Breeding Station, has established that the plant botanically described as Symphytum Peregrinum is a true hybrid. Its name should be 'X S. Uplandicum', but it is not proposed to add this additional name to the problems of the crop. The parents are Symphytum Asperrimum and Symphytum Officinale, both of which have 36 chromosomes like their more productive offspring. S. tuberosum, the Tuberous Comfrey with large black roots rather like those of a Dahlia, and entirely different flowers and foliage, has 72; it does not, therefore, interbreed and is of no agricultural or medicinal value, though it is sometimes tested by Research Stations as "Comfrey". "

The original cross was probably a natural hybridization that took place in the collection of Symphytums gathered by Joseph Busch, the Hackney (London) landscape gardener who laid out the grounds of St Petersburg Palace for Catherine II (the Great) of Russia. Plants were sent from there from 1870 onwards (other Symphytums were sent earlier, the first in 1790), and the latest import is reported to have been in 1900. Since Henry Doubleday selected the solid-stemmed "Russian

Comfrey", so called to distinguish it from the parent species, S. asperimum, the Prickly Comfrey, which was already being widely grown and exported from England to the Continent by James Grant, the plant has had a confused genetical history.

The original hybrid was sterile, or semi-sterile; the stamens are shut off by a kind of "false bottom" in the flower which is, by a freak that may occur perhaps once in every 100,000 flowers, sometimes available for bees to transfer as far as it will go among the neighboring blooms. The pistils are, however, always open to receive pollen from our native Common Comfrey (also found in Europe, including Russia), both the cream- or white-colored true S. officinale and the purple-flowered S. officinale var. patens. Seed, which takes three years after sowing to reach the size of a normally planted offset, therefore produces widely varied offspring, because it is either that of a self-pollinated hybrid or the backcross of a hybrid with its least productive parent.

Any surviving neglected Comfrey patch will include the results of seeding in the past (the plant has no seed dispersal mechanism; they fall around the parents or are thrown a short distance as a 4 ft. specimen sways in the wind), either from self-pollination or cross-fertilization, and can show a wide range of variation. It also, because though the roots die out others grow from the younger portions, can contain specimens that have increased vegetatively. This has created problems of identification and can be extremely hard to say exactly to which species a Comfrey belongs.

Many attempts to repeat the original cross by artificial pollination have been made, but so far without success. But there is no doubt that Peregrinum as it has survived and been carefully retained exhibits all the vigor and vitality of a first cross, and has inherited the virtues of its parents, the resistance of its father to disease and insects, and the full medical value of its mother, Officinale, plus productive capacity far beyond both.

For the sake of the botanist we quote the following further information from Comfrey Report No. 1.

"A modern botanical account of the Symphytums will be found in

'Flora of the British Isles' by A.R. Clapham, T.G. Tutin and E.F. Warburg (Cambridge University Press, 1952). Symphytum asperum was formerly S. asperrimum Donn and it is illustrated in color and described in Curtis's Botanical Magazine, Plate 929. S. peregrinum is illustrated and described 73 years later (Plate 6466)."

The choice of Peregrinum by Henry Doubleday from amongst the many Symphytums was based on several factors. Here are the words of Thomas Christy, his associate. "The solid stem variety is far more palatable, and in every way it has proved superior to anything grown in this country (England) called 'prickly Comfrey' (Asperrimum). On good land Peregrinum is fully equal to giving 120-150 tons an acre (30-37,500kg per 1/4 acre) from plants placed one yard (90cm) apart each way" This was written in the 1870s.

Another writer, K.B. Edwards, whose work written in 1873 can still be found in the Bodleian Library at Oxford, speaks of the growing and use of Peregrinum, and claims 10-15 tons to the acre in one cut (2,500-3,750kg per 1/4 acre) 50 tons per acre (12,500kg) in the first year, 80 tons (20,000kg) in the 2nd year and 100-120 tons (25,000-30,000kg) in the 3rd year. He also speaks of a neighbor who fed three cows and two horses off the produce of a 1/4 acre.

Back in 1881 the report of the Royal Agricultural Society of England, Vol. 18, gave details of the remarkable results achieved by farmers with Peregrinum, or Russian Comfrey, as Doubleday and Christy had named it.

Their basis of selection was yield, food value, and palatability. The plants are identified by their solid leaf stems, shape of leaf, no wings continuing down stems from leaves on flower stems, and the color of the flowers.

It is important to note that no research on Symphytum Peregrinum has been carried on outside of England until now, and it has only just started elsewhere, including Japan. The Food and Agriculture Organization of the United Nations has confirmed this lack of scientific research. It is not cultivated in the USSR (or at least was not until it went back there from Japan in 1962). Some experiments were done in

Europe and the USA in 1899, but in these cases the type tested was Symphytum Asperum, Lebech (Asperrimum) introduced to agriculture about 100 years earlier. We have said almost enough about the types, but before passing it is desirable to say a further word about Officinale.

Officinale

The records of Officinale or Common Comfrey go back in England to 1568. One book of medical herbs published that year, Turner's Herball, says of Officinale "The rootes are goode if they be broken and dronken for them that spitte blood and are bursten, the same layde to are goode to glewe together freshe woundes."

In 1633 a report was published, a copy of which is in the Royal Horticultural Society Library which says "The Great Comfrey (or the Great Consound) hath rough hairy stalks and long rough leaves much like the garden Buglosse, but greater and blacker (dark green), the floures be round and hollow like little bells of a white colour, the roote is black without and white within and very slimey. This differeth in no way from the former (Symphytum Officinale var. patens), but only in the colour of the floure which is yellowish when the other is reddish or purple...Comfrey joyeth in watery ditches, in fat and fruitful meadows, they grow all in my garden...The rootes of Comfrey stamped and the juice drunk with wine helpeth those that spitte blood and healeth all inward woundes and burstings".

One has to look back at the state of medical science at the period to realize how important such a medical herb was then. Common Comfrey probably gave a person the best chance of survival from acute appendicitis or gastric ulcers (if such a modern ill was known in those more leisurely times). Internal bleeding of any kind from ulcers to hemorrhoids called for the healing power of Officinale.

Another point worthy of note is that whereas Common Comfrey "joyeth in watery places (ditches) and along the sides of channels and creeks where it grows in England even today, Peregrinum does not do well in such places. It needs high land, hillsides and mountains to do its best; deep soil where its long roots can go deep down to the subsoil. From our experience in Japan it prefers its natural habitat in the

mountains, and the best Comfrey so far produced here grows 800 meters above the sea, a place with a cold winter and hot summer.

* * *

I introduce here a note on our experiment of getting Comfrey growing at our place in Shimoda, about one kilometer from the sea, some 60 meters above sea level.

The planting and growth of Comfrey at Shimoda was a really enlightening exercise. The small fields are terraced, with falls of between 60 cm to 1.5 meters from the top land to the bottom field, 10 in all. We were shortly leaving for Australia. It was early spring in Japan, autumn in Australia. We very quickly got the offsets in and off we went. When we came back some 4 weeks later the plants were in vigorous growth, but with a marked difference from field to field. As they grew, the fastest and tallest growth was in what we call the big field, some 20 m x 6 m. Not only was this a less clayey field with good workable loam, it had the advantage that along the upper side, at the foot of a stone retaining wall some 1.5 m high, a gutter of water, when it rained, that ran along to the small creek at the far end. The water came out under the wall, fed from the hillside that rises from our boundary. In the next two months, April and May, the plants came into full flower and the flower stems were shoulder high, ready to be cut for compost.

Why was the growth so vigorous here, we asked. We found that the water from the channel had flooded the field before escaping to the creek and this had so stimulated the growth that the plants had reached their maximum potential height. Down in two of the lower fields bordering the creek we set out our pedigreed Nos. 4 and 14 clones received from Mrs. Greer, whom I refer to elsewhere, but these fields tended to become water-logged with the heavy clay soil, with drainage to the creek not sufficient.

It would have taken a lot of work to change the slope of those fields with the available time to do it too restricted in our two visits a month (at most 6 days) driving the 175 km from Tokyo where our work kept us. Copious water is a help in good Comfrey growth, but water-logged

soil is an enemy. We found too that in a long dry spell before the spring rains come, followed by the rainy season, the plants continued their growth, even if slower, in all fields.

In summary, one can say of Officinale that while it has good medical properties it is far less valuable than Peregrinum. It has paler green leaves than Peregrinum, it has a higher fiber content, lower speed of growth and even with the best manuring and location it cannot compare with its later offspring. It can be identified by its flowers: white to cream and red, with one variety dull purple. The leaf wings continue right down the flower stems from leaf to leaf, the leaves are narrower and sharply pointed with thin stems and the yield is low. It is also subject to rust (Melampsorella Symphyti), which does not affect either Asperrimum or Peregrinum.

It is valuable for reference to note the following comparative mineral analysis of these two Comfreys:

(Unit:%)

	Peregrinum Bocking No.4 (Predominant strain in Websters)	Peregrinum Mixture	Officinale
Calcium	2.35	2.58	1.31
Phosphoric Acid	1.25	1.07	0.72
Potash	5.04	5.01	3.09
Iron	0.253	0.457	0.098
Manganese ppm	137	201	85
Cobalt	trace	trace	

Many reports of tests conducted during the 19th century show widely differing results. But it must be recognized that the types of Comfrey tested varied greatly, the cultivation methods varied, the climatic and soil conditions varied, and of course under such conditions the results were seriously misleading. This proved a great handicap to its development. It should be noted that from the time of Henry Doubleday until now it has not been possible to obtain the same high yield obtained in England by him and Christy and a few others from

1870-1900. But now, as a result of these more recent developments his figures are being repeated, at least in Australia, New Zealand, Canada, and Japan. We believe that one of these days, under ideal conditions, some expert will produce 200 tons of green leaf from one acre in one year, i.e., 50,000kg from a 1/4 acre. It is theoretically possible. We hope to see it done, and when it is, it will mark a new peak in man's search for high quality food.

The highest known figures for Officinale in recent years is from Holland in 1936—36 tons to the acre (9,000kg per 1/4 acre), Asperrimum gave 50 tons to the acre (12,500kg per 1/4 acre) in Denmark in 1940.

The Webster Strain of Peregrinum

As stated earlier, there are two main strains of Peregrinum grown in England. It is worth space to give some information on the background and history of these plantations.

First we want to pay a tribute to the late F. Newman Turner who died in July 1964, former editor of The Farmer. Mr. Turner was also President of the Henry Doubleday Research Association at the time of his death. He was the author of three books on Organic Farming, and a well known broadcaster on farm subjects. It was his work that uncovered the secret of Vitamin B12 in Comfrey.

A quotation from Comfrey Report No. 2 published in March 1963 by the HDRA tells the story of this epoch making discovery.

"The important vitamin, among all the many that are also present in other vegetable crops, is B.12. Comfrey is the only land plant known to extract this from the soil.

The discovery was made in the summer of 1959 by F. Newman Turner M.B.N.O.A., who was Consultant to the Society of Medical Herbalists, in the course of his work with the tablets of dried Comfrey used by the Association in its medical work for the relief of Asthma and bronchial complaints. His practice included a number of cases of Vitamin B12 deficiency among vegetarians who do not eat milk

products or eggs, and he found that the tablets were producing an effect that indicated the Vitamin was present. This was later confirmed by the experiences of John Beck and Geoffrey Wheeler, two Chinchilla breeders who found that feeding the green leaf cured the symptoms of deficiency. Chinchillas are natural vegetarians and in their wild state they probably find some plant or moss that provides the little they need, which is supplied by 6 square inches a day of fresh Comfrey leaf, or leaf tablets, which they nibble like nuts.

F. Newman Turner, through the Association, had the first analysis made of Peregrinum Bocking No. 4 from the trial ground dried to flour, and his opinion, first stated at the foundation meeting of the Vegetarian Nutritional Research Centre, was confirmed.

As a matter of historic interest, the analysis was made by Dr. A.H. Ward of Aynsome Laboratories, Grange-over-Sands, Consulting Analyst to the H.D.R.A. The date was 28th October 1959, the Laboratory Number Y.649, and the framed certificate was shown on the H.D.R.A. stand at the Royal Horticultural Society Hall in November 1959. The amount present was 0.58 micro-grammes per 100 grams."

F. Newman Turner was a grower of Comfrey for many years, his farm having been originally a racing stable and more recently a dairyfarm, and he grew Comfrey for both purposes. He held the unbeaten record of Comfrey growing in Britain in this century 67 tons per acre (17,000kg per 1/4 acre) with Peregrinum.

The Stephenson strain of Peregrinum (clone No.14) is the oldest established plot of Comfrey growing in Britain and was planted in 1938, which at the time of writing, 1965, adds up to 26 years in the same place. This was grown also originally for race horses, and at one time comprised 4 1/2 acres of Comfrey. It is still used mainly for racehorses and pigs, the farm being a stud farm, the Hunsley House stud.

What is known as the "Webster strain" was a new importation of Peregrinum from Russia in 1900, the same type as Henry Doubleday imported thirty years earlier, but so far unable to attain his figures of production. Most Comfrey offsets that have gone abroad from England

since its revival in this century have been from this strain. This same strain has been grown and sold for over 60 years by the Webster nursery, and the first trials conducted in England by Lawrence Hills were with 500 offsets from these plants. These were planted by Mr. Hills in 1949 as a research project and marked the beginning of the new era of Comfrey research and cultivation. These can be called an improved selection from the Webster stock. It is from this source that our Japanese Comfrey has come by way of Mr. Savage of Australia and Mrs. Greer of England.

It is important to note that the Websters had "rogued" their crop, i.e., they had carefully eliminated low producing plants, or plants that varied too greatly from the established type. It is only by this careful elimination of 2nd class plants that one can achieve best results. As we have pointed out already, no farmer can afford to have low producing or even unpalatable plants as part of a permanent crop. So it is necessary to observe carefully and eliminate any plant that is below standard. Dig it out, feed it to the pigs, roots and all. This is the cheapest in the long run.

Because it is only possible to propagate Comfrey from offsets, the initial cost of establishing the crop is high, so every care must be taken to see that all offsets are the best, and taken only from the best plants. See that:

1) Your offsets come only from an established crop, tested over at least three years, and of proved palatability to all stock.

2) That the seller can certify the yield of his Comfrey plants, thus guaranteeing your results.

3) That they are true type as to leaf shape, and flower color, free from wings on the flower stems, and with thick heavy stems to the leaves.

4) That the offsets are free from nematodes.

5) That the offsets are freshly cut, and free from any form of slime or rot, and properly packed on sending, and not less than 6-8 cm long

and 1 cm thick.

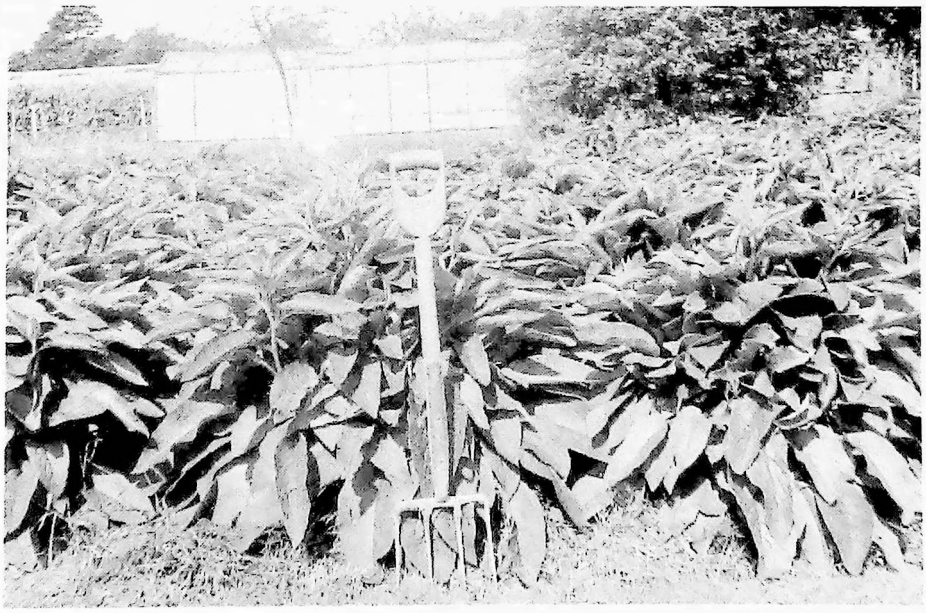
6) If started offsets in leaf are available these are preferable so long as the offset is of adequate size.

On the basis of our experience in Japan over the past six years when this was written, it is possible to say that almost anywhere that the soil and conditions are suitable, Comfrey should yield at least 60 tons to the acre in the second year. If it does not, there is something wrong either with the Comfrey stock or with the method of cultivation. In many parts of Japan the figure should reach at least 100 tons by the third year (25,000kg per 1/4 acre).

Poorly grown or wrong type of Comfrey will not give the analysis set out. Better methods of cultivation have improved this analysis, and increased the palatability and food value of the crop.

The work of identifying and classifying the clones of the hybrid Comfrey was done by Lawrence Hills with these replicated trial plots at the original home of the Henry Doubleday Research Association, Bocking, Essex, England.

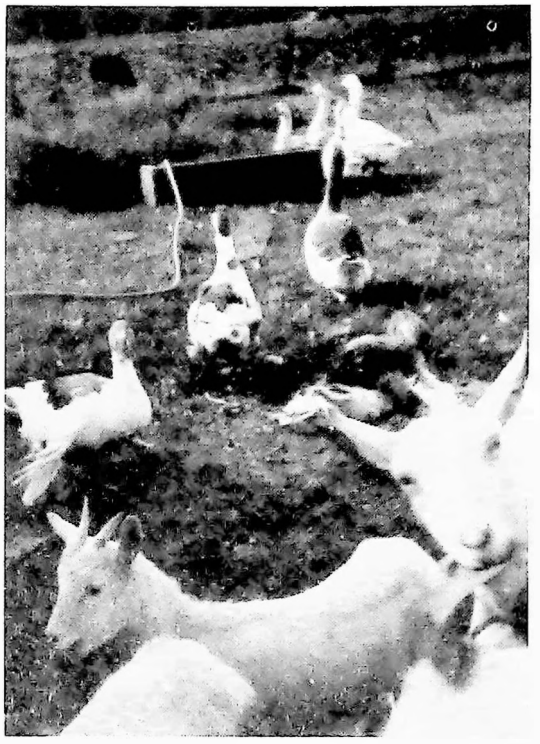
History is Made — Mr. Hills comments: "These Comfrey plants came from his original trial plots, work that began in 1948. From these No. 4 plants, Mrs. Greer sent offsets to Foster Savage in Victoria and to Andrew Hughes in Japan.



Comfrey — No. 14 on H.D.R.A. trial ground. Ready to be cut.

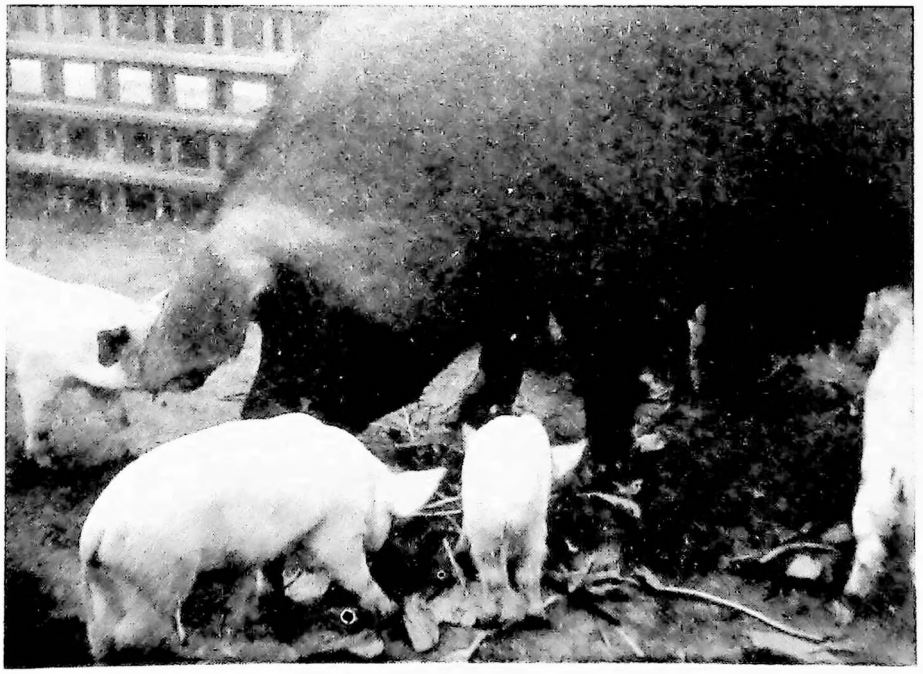
Lawrence D. Hills: Leading world authority on Comfrey at the Henry Doubleday Research Association farm.

Calves fed on milk and Comfrey on Mrs. Greer's farm.



(right)
Goats & Geese
eating cut-Comfrey

(below)
High ratio of protein
to fibre makes Comfrey
ideal for sow and litter.



Geese fattening on Comfrey 6 weeks rotation on wired plots. (Photo - L.D. Hills)

E.V. Stephenson in his Comfrey plot (No. 14) in its 35th cutting season. Used for feeding race horses on his famous stud farm, and for Essex pigs which he bred.

The Cultivation of Comfrey

At the very outset it should be emphasized that only those who understand it can get the best result, which is true of everything we do. The technique is based on sound knowledge of the nature of a plant or animal or whatever, which is necessary if one is to get even good results. To get optimum results requires even deeper knowledge born of study plus experience. So it is with Comfrey.

1) Selection of a Site

a) Permanent site

Comfrey is a perennial. There is no known limit to the number of years one plant will grow in the same place without deterioration if given proper cultivation. Planting Comfrey is more like planting a tree than planting grass. It is there to stay, so it must have a permanent place, and preferably a place to itself. Comfrey needs special care, and a large plantation for farming or commercial purposes (say, 1/4 acre and upwards, more than 1,000 plants) should be given a clear open space where mechanical cultivation is possible. For farming, its location should be convenient for feeding to stock, the drying of leaves and composting of the surplus, and where ample supplies of organic manure are easily available.

In winter when the crop is resting (in the Kanto area of Japan (a wide area, that includes the city of Tokyo), usually for about 10-13 weeks) it is possible to grow winter vegetables inter-row. Comfrey is normally planted about 60-90cm between the rows each way, and the leaves will cover this area when in full growth, but in the winter period this space need not be left idle. It is also possible to grow clover inter-row in season without harm to the Comfrey. In fact, the nitrogen-fixing habit of the clover will help the nitrogen-hungry Comfrey.

Comfrey must be kept free of grasses, otherwise it will suffer from nitrogen deficiency.

b) Climate

Our hybrid Comfrey comes originally from an area high in the hills and on the mountain sides, where winter is cold and the summer hot, and where its roots can go down deep into the soil. But it has been demonstrated that it does well in a wide range of climate from the cold north (Hokkaido) to the sub-tropical Kenya. The Kenya climate gives a 12-month growing season, and here the yield is the highest in the world.

It will also be noticed in the photo that the hot sun spreads the plant outward, whereas in a colder climate the same plants will reach upward rather than sprawl. It is safe to say that Comfrey is one of the most climate-adaptable fodder plants in the world, comparing favorably with the highest producing clovers in this respect, but yielding much more and better food.

c) Location and Soil

The growing habit of Symphytum Peregrinum, which, depending on the depth of soil and subsoil layer, puts its roots down as deep as 3 meters in 3-4 years, indicates that it should not be planted on low level paddy field type of country. It does not like wet feet. Because it is there to stay when once planted, choose a site on high land (one name of Peregrinum is Uplandicum) where it can be permanent. It will do well in a wide variety of soils, from sandy to clay, so long as the soil is cultivated properly and kept close to an optimum of 7.2 pH. As an indication of the response of Comfrey to its environment we can say that high in the mountains of Nagano-ken, Japan, Comfrey has done very well. The cold winter, the hot dry summer, with the plants facing the south in the deep mountain soil—these conditions have combined to produce the very best quality Comfrey leaf, under best organic cultivation.

For the benefit of those who will want to grow one or two or up to five plants for domestic use as a fresh vegetable and other uses, we suggest a warm sunny place facing the south (in Japan), planted among other shrubs if you choose, but kept free of grass.

2. Preparation of Soil for Planting and Layout of Crop

a) The home and small plantation

In this case it is possible to open up the soil for each plant to a depth and width of 30cm each way and place 5-8kg of poultry manure compost in the hole. This basic manuring is ideal for getting a plant established and into quick growth. If poultry manure compost is not available use other forms of well rotted dung, cattle or stable manure, pig, night-soil, fish meal, etc. If the manure is fresh and not composted, mix it well with straw and soil and put it at the bottom of the hole and it will activate there. Cover this base with soil mixed 50 x 50 with compost and plant the offset vertically, budding (large) end up, about 3cm below the surface. Cover the whole with a mulch of straw, leaves, or dried grass cuttings and the offset will break through with leaves in about 8-10 days.

b) For a farm where planting is in cultivated land the digging of holes is not necessary. But on poor or uncultivated land it is a great advantage for the growing of Comfrey, with best and quickest results. Standard spacing recommended throughout the world and based on experience of intense cultivation is 60-90cm each way between plants for farm use, the distance determined by the machine used for inter-row cultivation. This is for standard stockfood cultivation, allowing for mechanical operation of manuring and cultivating, where the Comfrey can be cut in strips, cutting only enough each day for that day's needs, cutting the crop completely over 28 days.

For those who plan to cut the leaves when smaller, say every 21 days, when the protein content is higher and the fiber less, planting can be reduced to 50 to 80 cm between the rows each way to suit small machine cultivation, or even 50cm between plants and 80cm between rows. This must be left to the intelligent judgment of the farmer who will adapt methods to suit his or her needs, machines and general plan of the farm.

This method of straight line cultivation makes for easy cultivation by small farm machines.

3. Offsets

It has already been pointed out that hybrid Comfrey cannot be grown from seed, so propagation must be by offset.

An offset is a main root (rhizome) section, or a section cut from the crown of the plant. For quick and good results we have established that an offset should not be less than 6-8cm in length, by a diameter of not less than 1cm at the thinner end. If the diameter is 2-3cm the length can be less, but small offsets take too long to begin to get their nutrition from the soil. They must wait until they have a root structure, and food reserves in small offsets are insufficient. Be sure to get good big offsets, or you cannot expect the best results in the first year.

Some growers sell started offsets and this is a good practice, but naturally these cost more, and some growers prefer to get their offsets in the winter, and start them individually in paper pots under vinyl shelters to get early spring growth. Offsets will put out shoots at soil temperature of 10°C.

Offsets should not be bought from inexperienced sellers. Commercially mature plants in the 3rd or 4th growing season are best for cutting offsets, because this allows for the observation of the plants to ensure true and best type, and to allow for the elimination of low yielding or otherwise unsatisfactory plants.

4. Multiplying the Crop

The farmer who can afford it will plant his whole plantation in one season. This is costly, because good offsets are not obtainable at a low price. But as they are there to stay, not to be replanted each year, this is a one-time expenditure. For those who want to experiment first we recommend the following procedure: Get 50-500 offsets, based on an ultimate plan for 500-5,000 plants. Grow through one year without disturbing the plants, allowing them to become well established, with deep roots. Then at the very beginning of the spring, take a spade, and cut the crown right out of the plant to a depth of 10cm. Cut this into as many sections as will give you good large offsets. This will give you 10-20 offsets from each plant, depending on the size of the parent

plant, enough offsets for a large plantation. By this means 1) the parent plants can be carefully observed through one year, and the cultivation methods studied and practiced. 2) The cutting of the crown leaves the root structure untouched, and any plant so cut will quickly recover. 3) You will get a 100% strike. At this stage of early spring the plant is just breaking into growth, and the Allantoin in the plant is up in the new-forming buds, and the new plants will get away to a quick start.

No nursery bed is necessary for such new offsets. They can go right into the fallow land that was limed and prepared in the autumn, and then tilled and fertilized ready for the new crop in the spring.

5. Cutting

Well cultivated Comfrey plants give leaves up to 90 cm long every 28 days, especially in summer and autumn growth. In the spring the plants go into early flower and the leaves are smaller, with heavy flower stems. This is good Comfrey, but not so well liked by the stock, though pigs and chickens will eat it readily. In some respects this is the best medicinal Comfrey because the Allantoin content is high in the flowering stage. But Comfrey is mostly grown for its leaves. The method of inhibiting flowers is to cut the plant frequently (every 3 weeks at most) before the flowers open, and cultivate with after-manuring of high nitrogen, organic manure. Poultry manure is best for this. It is rich in nitrogen and calcium, a combination ideally suited to Comfrey. The poultry manure should be composted for optimum results, or deep litter poultry manure can be used as it is, spread around the plants and worked into the soil, just clear of the roots.

The simple principle to remember is that the growth of leaf needs high nitrogen, whereas the production of fruit (seeds) calls for higher phosphate, and the formation of roots (tubers, potatoes, etc.) calls for higher potash. So feed a higher balance of nitrogen to the Comfrey to promote leaf growth. But use all Comfrey cut, even to the flowers. It is all good stockfood.

The long established triple rule for Comfrey growing is, "Keep it clean (free of grass) keep it fed, keep it cut".

Frequent cutting (21 days) will increase the total yield, and 28 days in summer is the maximum period the leaves should be allowed to mature.

The principle in cutting is to cut the whole plant right off, large and small leaves a few centimeters above the soil. In a small plantation (e.g. 1/4 acre, 1,200-1,500 plants) this means cutting 60-70 plants a day to harvest the whole crop in 21 days or 40-50 plants on a 28 day cycle. This is easy to do by hand.

6. Feed the Plants

We can point out here that the 21-day cut means cutting at highest protein content and lowest fiber, a very suitable food for chickens and pigs especially. But in order to do this well it is necessary to pay special attention to regular after-manuring, which should be done after every cut. Plants should also have organic micro-element spraying. Recently some very valuable organic micro-element seaweed-based products that originated with Comfrey growers have been put on the market. The spraying of the leaves of Comfrey with one of these increases the solids of the leaves.

It has already been demonstrated by more than one Comfrey grower in Japan that Comfrey treated with these organic micro-elements or grown in soil treated this way is not seriously affected by nematodes. Another noticeable result of foliar spraying or soil treatment with these organic micro-element mixtures is the remarkable increase in feeder (hair) roots on all plants so treated. This applies not only to Comfrey, but to other plants as well. This means increased vigor and growth rate.

What is it that one wants of Comfrey? Large quantities of high grade food at low cost of time and labor, palatable to stock, and with continuing supplies through the years. You get all this with properly grown Comfrey. In addition you get high therapeutic value to cure and to protect against disease. But to get this at full value, the plants must be fed with high grade organic manure regularly, plus organic micro-elements. This is not to be wondered at when you consider the vast quantities of food, including protein, fat, carbohydrates, minerals and vitamins that Comfrey yields. To produce this with every plant

averaging 4-5kg of leaf every 28 days, the plants must be fed, and fed on the best plant food.

7. Comfrey Does Not Like Chemical Fertilizers

It can be flatly and absolutely stated that Comfrey will not do well on anything but organic manure. It will grow, but will not do well unless it has ample quantities of Vitamin B12 in the soil. In addition, nematodes, which are a big problem in Japan, provide clear evidence of the overuse of chemical fertilizers that have seriously upset the organic balance of the soil, so that the soil is deficient in essential bacteria and fungi on which nematode control so greatly depends.

So plan your Comfrey growing and the health of your stock and of yourself by getting large supplies of organic manure of all kinds ready, and get a big compost heap maturing to maintain a constant supply for the growing plants.

Optimum soil conditions call for pH 7.2. To prepare the soil, heavily lime the ploughed fallow before winter, and open it to snow, rain and sunshine. Then depending on plantation needs—large scale or small scale—get the compost and organic fertilizer ready so that every plant can get 4-5kg of rich food at planting. If available, cover every offset with rice or other straw or mulch, and this will not only keep the soil warm, but will promote the rapid development of soil fungi and aerobic bacteria. Then when the leaves rise and spread over the surrounding land like a fountain, it will keep the leaves clean of soil.

8. Organic Manure and Compost

All forms of organic manure are suitable. Human excreta (night soil) used in the old traditional Japanese (not used now) method is also good if properly composted, being an excellent source of Vitamin B12. But there is not any doubt that poultry manure is first class—not just dried droppings from caged birds, which should be composted to give optimum results, but rich deep-litter chicken manure, if available.

The preference for poultry manure lies in the excellent blending of high nitrogen and calcium, both needed in large quantities by Comfrey.

The deep litter from chicken pens is hard to get now with most birds kept in cages. But its value lies not only in the nitrogen-rich droppings, but in the fact that Vitamin B12 develops in the deep litter, in the fungus growths so relished by the chickens that scratch in the straw.

Stable and cow-shed manure, full of straw and stacked to mature, is also top class. Pig manure, especially straw based, is high quality too. The application of these will restore nature's cycle, returning to the soil what has been taken from it. For those to whom composting is a long slow job, with heavy work and a long period of waiting, the period of maturing compost can be reduced to 6 weeks instead of the usual 3 months, making the turning of compost unnecessary in the process. One of the micro-element concentrates made from kelp can do this for the farmer and add the necessary micro-elements to the compost at the same time; by this means all essential elements are added to the soil in manuring. This is the 100% method. The heat generated in the compost if properly prepared (up to 70°c in three days) destroys dangerous bacteria.

9. When to Plant, and Other Questions

Comfrey offsets can be planted at almost any time of the year, depending on the local climate. From early spring until mid-autumn is generally suitable, but for those working to a planned development we can confidently recommend the following plan. In the northern hemisphere, plant trial offsets from mid-August to the end of September to get plants well established before winter. Do not cut the last leaves when growth slows down at the end of the autumn. Let all the strength return to the roots. This is good advice for all Comfrey growers, even with established plants. It will strengthen early spring production.

Plants will survive even through severe winters, as has been proved in cold Hokkaido, and begin to grow again as soon as the spring thaw comes. These autumn sown plants will give maximum first year yield. If conditions are suitable, plants may be given vinyl shelters, and will continue to provide winter feed, even without artificial heat if the climate is not too cold.

Do not force young plants. Over-feeding at the surface will tend to inhibit deep root growth, and Comfrey needs to get its roots down to the subsoil as fast as possible to become strong and well established.

Leave plants to die down at the end of the autumn. The early spring production of these plants will be greatly improved. Spring is the season when large quantities of green feed are needed by the dairy farmer as early and as fast as possible.

10. Rogueing the Crop

For those who want to grow only first class Comfrey, it is necessary to carefully observe the plants. If any plant is not doing well by comparison with your other plants, one must ask why. If the leaves are smaller, if the rate of growth is slower, if one cutting from an established plant yields 2kg when other plants give 4-5kg of leaves at a cutting, what is wrong? If the crop is doing well, in heavy growth, and then suddenly the leaves begin to wilt and die what is wrong?

In the first case, offsets may have come from untested plants, from a crop that has not been rogued, with poor type plants eliminated. With a hybrid plant this can always happen, and is why we emphasize again, that every grower should obtain offsets only from tested and proven plants. Your own plants then need to be proved. It is cheaper in the long run to get rid entirely of poor yielders, feed the whole plant to the pigs, roots and all. Multiply your crop only from your best plants, of uniform type and production. Look at the uniformity in Mr. Quicke's plants, and in the other well established plantations illustrated in this book.

In the second case, where suddenly a good plant falls ill and dies, look to the roots. The chances are 10-1 that it is due to nematodes, and if you want to save your crop you will treat the soil at once. As soon as it is treated, look to the soil structure for permanent rectification organically and with micro-elements. If this is done, there will be no need to inject chemical poisons into the soil.

Do not neglect your crop. At one place in Japan we found a crop of Comfrey that had been allowed to run wild, with great sprawling plants

in flower, and all uncut. What will happen to this crop? It may chance to make seed, as it is possible that once in 10,000 chances a bumble bee (not the honey bee, which cannot penetrate to fertilize the flowers) may cross pollinate. There may even chance to be a crop pollination with Japan's native Hirehariso—and the seed will fall around the plants and germinate. It takes about 3 years for such a seed to grow into a reasonable sized plant, but it can happen. The result will be a greatly reduced quality in the resulting neglected plants. They will become weeds.

So cut your Comfrey, keep the flowers from maturing, and keep the crop up to highest standards.

11. Silage, Hay and Compost Making

The use of surplus summer production of Comfrey for these three purposes is an important part of the farm economy, and calls for planning and careful attention.

1) Silage. Making Comfrey silage is not easy because of the low fiber content and the close ratio of protein to starches and sugars. The conservation of Comfrey as silage has been greatly handicapped by lack of understanding of the analysis. If the bulk of protein is to be preserved by lactic acid fermentation of the carbohydrates, either an outside source of these appears necessary or the difficulty of ensiling a crop with such a close ratio of protein to starches and sugars, must be overcome in other ways.

The simplest method was devised by J.W. Hobbs of the Great Glen Cattle Ranch, Fort William. He uses 25% Comfrey with 75% of a cereal-legume mixture, cut with the oats at the milky stage. The gain in protein from the Comfrey has more than justified his 3-acre crop.

Excellent silage was made by the A.I.V. (employing added acids) process by Jealotts Hill Research Station, and the figure for this in the table below is quoted from 'The Science and Practice of Conservation of Grass and Forage Crops' by Dr. Stephen J. Watson. In 1953, Messrs. Silorator Ltd. made pure Comfrey silage, using their machines on their acre of first-year Webster Giant strain. The moisture is given in the

first column; the other nutriments are percentages of dry matter, in all silage analysis figures.

	Moisture	Protein	Oil	Carbo-hydrates	Fiber	Ash
	%	%	%	%	%	%
Comfrey Silage (A.I.V.)	79.20	22.42	2.72	42.68	12.85	12.35
Comfrey Silage (Silorator)	82.52	18.40	3.90	41.40	23.70	12.60
Good Grass Silage(Bul.48)	79.00	18.10	4.76	47.20	20.40	10.00
Good Maize Silage(Bul.48)	81.05	8.65	4.32	78.60	40.60	7.60

Messrs. Silorator report that their silage, made without molasses, had a pH of 5.5; it was well fermented and palatable to cattle. An analysis by the North of Scotland Agricultural College of Mr. Hobb's Comfrey and cereal-legume mixture silage, made by putting both crops through a chopper blower, showed pH 4.5, protein 14.37% and moisture 79.9%. The mixture minus Comfrey was 10.08% protein with 85.43% moisture. The improvement is worth obtaining when a relatively small Comfrey plot can provide the 25% from successive fields cut for silage.

Further research on silage-making is highly desirable so that the summer production can provide winter fodder instead of coming at a time when there is plenty of feed. Unfortunately, it is not possible to make silage on a small scale, and cutting in bulk would have meant financial loss to the pig farmers in the trial. The exact degree of wilting to avoid excess moisture in the product, the quantity of molasses needed to hold the protein, the use of milk by-product Lactic acid, and whether 25% is the ideal proportion to mix with an arable silage mixture, need to be established by research.

2) Hay. The drying of Comfrey leaves is difficult where the humidity is high, and the problem is added to by the moisture in the thick leaf stems. Orthodox hay methods are not satisfactory, as the foliage tends to heat before it can dry. Various methods of drying have been tried by farmers in England with varying success, and the success in Japan could well depend on the season and climate when it is done.

One method used is to spread the leaves to about 5cm deep all over

an iron or tiled roof, covering them with a net to save them from the wind, and leave them exposed to sun and rain until the leaf stems are dry. This means moisture is down to about 10%-13%. Leaves can then be raked down and stacked in a barn or put through a hammer mill and used as meal for pigs or poultry.

Drying on wire racks can be satisfactory. Stacked on wire racks inside a large shed is also possible. Free air circulation is necessary, and drying should take not more than three weeks. In a hot, dry climate it can be done in 4 days. It would appear that autumn in Japan would be the best time, when the humidity is down from the summer. Or even late spring before the summer humidity rises.

Mechanical dryers are not usually available, but where there are silk dryers not in use and available, these might well be employed for this purpose. But there is no doubt that where facilities are available, it will adequately compensate the farmer, by adding to the store of high protein feed available for stock.

One aspect of drying of Comfrey should be kept in mind. It is that slow drying will reduce the quantity of Beta Carotene for conversion to Vitamin A in the liver. One fresh weight (green leaf), analysis of Comfrey done in England revealed 77mg per kg of leaf. In dried Comfrey leaf the highest figure known was 400 mg per kg. The New Zealand analysis shows 170mg per kg, which is a good average taken over a year. It is also clear from various analyses made in England that the spring growth is highest in Carotene, and this would confirm our suggestion that good hay could be made in Japan in late spring, before the high humidity of summer. Quick drying of Comfrey in a large open shed, with the leaves spread on drying racks, and with the hot African sub-tropical sun beating down on the roof yielded a high carotene of 277mg per kg in hay in Kenya. All of which suggests that surplus Comfrey should be dried as fast as possible, compressed into bales, and stored in a cool dry dark place to be fed out when needed in the winter.

3. Composting. Comfrey compost has been demonstrated to be of very high quality, and the mineral analysis proves it to be excellent for crops such as potatoes. So no leaves should go to waste. Some small growers in England grow Comfrey just for the making of compost, and the

results amply justify the method. It is not possible in this book on Comfrey to go into details of the various methods of making compost, but these details, with information on specific materials to be used, are available. There have been important developments in this field recently, speeding up the process, simplifying and reducing the labor needed, and improving the quality of the compost, and every Comfrey grower and organic farmer should have the know-how.

Comfrey As Stockfood

It is in this field that Comfrey can make a major contribution. Japanese agriculture is facing a crisis in more ways than one, and this paper was originally written in 1966 to meet the needs of agriculture in that country.

In the first place, Japan is importing larger and larger quantities of food each year, in spite of the advances made in the application and use of artificial fertilizers, and improvements in farming techniques. While rice is yielding some 13 million tons a year with bumper harvests, Japan is importing over 3 million metric tons of wheat and 2 1/2 million tons of maize a year (1963 figures). Stockfood for cows, pigs and poultry, including alfalfa, costs Japan hundreds of millions of dollars a year.

This means that the cost of production of high grade protein foods such as eggs, chickens, milk, pork, beef, etc. is far too high, and the return to the farmer in income is far too low. This is one of the main reasons for the second crisis in Japanese agriculture. In 1963 nearly 300,000 farm workers left their homes to become either migrant workers or go to the city. This is mainly due to the big difference between the income of workers in the manufacturing industries and on the farm, the difference being in the ratio of 3.6 to 1. How can the agricultural industry, which in the final analysis is the foundation of the life of any community, survive, while this disparity exists? Naturally young men and women escape from the drudgery of the farm to the relatively quick earnings of the factory and city. Some estimate that the

real number of migrant workers in Japan now is more than 1 million. The farm has become "San-chan Agriculture", ma, granpa and granma. And though father may come home for the rice planting and harvesting, he has to go out to other work to keep the pot boiling.

This situation is not unique to Japan. Many countries suffer from this unbalance in production. But Japan's problem is enhanced by the fact that the cultivable land is limited to 6 million hectares, at least under present methods, less than 20% of the total land space of Japan. Even this is being rapidly encroached on by factories and houses.

Another startling fact needs noting. In the past 10 years industrial production has increased phenomenally, with agriculture lagging behind. In 1954, agriculture represented 22% of the G.N.P. In 1964 it was only 13.5%. Why is it lagging behind, and why is Japan less able to feed its population now than 10 years ago? There is obvious need for a new look at agricultural methods and balance in production.

These three aspects of the crisis in Japanese agriculture add great weight to the value of Comfrey.

Comfrey is the greatest single potential source of high grade stockfood. It will yield the highest and fastest quantity of both protein and carbohydrate (plus all its other elements) of any plant. It reduces labor and although its primary cost is high, its ultimate economic cost is far below all other forage crops. It is better than alfalfa for food value, and what is very important to Japan, it will grow where alfalfa will not grow. Alfalfa is very choosy. Comfrey is remarkably adaptable both to climate and soil. It does very well on the sides of mountains, of which Japan has more than its share, on land quite unsuitable for pasture grass, clover, and other forage crops.

Comfrey will do well only under organic soil cultivation, and this means that the soil will not deteriorate year by year, but will continue to maintain both yield and health-preserving properties. Comfrey does not need insecticides and poisons to keep it free from insect attack. There is absolutely no waste from its production as every bit is edible by animal and man. Basically it is not subject to virus diseases or insects, and is a source of both nutrition and health.

Fed to young stock, calves, pigs and chickens, it will help to preserve their lives, protecting them from diseases, always a major source of economic loss to the farmer.

Having claimed all this for this wonder plant, we can point out that Japanese farms, like farms in most countries, need to develop a factory-like efficiency in production and operation. This point of reorganization would be a major factor in increasing and improving farm income and conditions of labor. In this respect Comfrey can play a major role because of its very nature as a food crop, its ease of handling, and its high efficiency as a raw material for production of first grade protein foods. One of Japan's problems is the production of the maximum from minimum space available. Comfrey is unexcelled in this respect, giving the highest yield of farm raised stockfood.

If you look again at the figures of production of Comfrey leaf per 1/4 acre, and its standard analysis of protein and carbohydrate, some idea of its uses for various stock will become clear.

In Japan the yield should be 10,000-25,000kg of green leaf per 1/4 acre per year, depending on climate, location, soil treatment, etc. The crop should be cut in rotation—so many plants each day, so that the total crop is cut between 21-28 days, depending on the purpose and the season. All surplus leaf cut in spring through autumn should be turned into hay or silage for winter needs, the rest into compost.

Poultry: For chicken raising and for egg production Comfrey is a major economy as a saving in cost of production. The protein—fiber ratio of Comfrey average is 3.4%:1.5%. Compare this with Alfalfa, which is 4.1% protein to 7.2% fiber at the same stage of growth. This Comfrey ratio varies with the season and the time of cutting according to leaf growth and with the methods of cultivation, but it is always a very high ratio. For chickens, leaves cut at 21 days are ideal, with maximum protein, minimum fiber.

Frequent cutting will also increase the total yield of the Comfrey crop. This ratio of protein to fiber is the highest of any fodder crop. This is one reason why ruminants must have additional fiber, and pigs need added carbohydrate especially in the last 10 days to get them

ready for market. Comfrey is not a complete diet for any stock, nor for man. But it is a great money saver as stockfood, and in addition, it provides a source of constant health and vitality, and freedom from disease.

The cost of prepared foods for chickens can be reduced 50% by the use of Comfrey. Eggs will be of better quality, the yolks will have deeper color, the Vitamin B12 content will be higher and the chickens kept free from common diseases. This means more eggs per bird and the use of Comfrey makes hens profitable to keep over their second laying season, saving the cost of pullet replacement.

Caged birds suffer from Vitamin B12 deficiency, and are subject to roup, coccidiosis, salmonella infection, and even cancer. Comfrey, by its very chemical structure will obviate these dangers and prolong the egg laying life of the birds.

For breeding birds, the use of Comfrey will increase fertility and the vitality of the young stock, making them much more resistant to disease and enable them to come through to early maturity.

If Japan were growing enough Comfrey, it would largely take the place of Alfalfa in prepared mash and pellets, now costing Japan many hundreds of millions of dollars. Alfalfa is too high in fiber for chickens. So is ryegrass and clover. Comfrey can be added to mash or pellet feed for chickens, up to any quantity found economical from the point of view of raw material cost of production. It will help increase production, whereas other grasses because of their fiber can cause many troubles to chickens, which cannot digest the fiber.

Pigs: In some respects Comfrey is regarded as having its greatest economy of use with pigs. Pigs can be raised very successfully and economically on a diet almost wholly of Comfrey, as high as 80-90%. Buying prepared pig food in Japan is the pig farmers No.1 outlay, representing 80-85% of production costs, and is a major factor in keeping the cost of pork and bacon higher than the average home can afford. Japan would consume much larger quantities of pig meat if it could be bought economically. It is clear that only farm grown Comfrey can make this possible and give the farmer an adequate return

for his labor, and give the people pork and bacon at reasonable prices.

Comfrey Report No.1 says, "The most profitable stock to feed with Comfrey in Britain today is the pig, and pig feeding pays even with yields of 7,500kg per 1/4 acre, when over 85% of the production costs for pigs is bought meal. The high ratio of protein to fiber fits the digestion of the pig, and their great appetite for it makes it highly suitable for a modern version of the Lehman feeding system, without the troubles from excess fiber in lucerne usually fed under this system. It should not be compared with fodder beet, which contains about four times as much carbohydrate, and only one-third of the protein, and slightly less fiber. The root crop (beet) is very much higher in labor cost than green Comfrey after the first year. One is predominantly a carbohydrate feed, the other, protein, and the fat on pork from pigs fed on a high carbohydrate diet becomes more and more unpopular.

The biggest liveweight gain from vegetable protein fed as much as they want comes in the early stages, and small weaners quickly level up to the bigger ones. Feed them all they will eat, and reduce the usual supply of meal to one half. Porkers coming on will take 4 1/2-7kg a day of fresh-cut Comfrey. The procedure is to take a daily cut, near the piggery or pig pasture, and throw it in to them. No wilting is necessary. The moisture, roughly the same as that of the mangel-wurzel, merely means that they drink a bit less than when on a dry meal diet.

With baconers there comes a stage, usually at about 60kg live weight, when carbohydrate needs increase, and the meal proportion should go up by as much as 500 grams per day, finishing at about three-quarters of the previous amount used. If growth slows after a good start, increase the meal a bit. The yardstick is profit per pig, not maximum liveweight increase in the minimum period, and small store pigs bought cheaply, so long as they are healthy, mean the most return for the small farmer on this system".

* * *

"E.V. Stephenson bought a batch of seven Essex stores at eight weeks old. At 16 weeks the pigs were eating 1kg of meal per head per day, plus 4kg Comfrey; the Comfrey quantity went up to 4 1/2kg a day

for the 19th, 20th and 21st weeks, still on 1kg of meal.

Weight Increase Table

20th week kg	21st week kg	22nd week kg
52	53	56
48.5	51	52.5
47	48	51
46.3	47.5	50
44	46.3	48
44	45.5	45.5
44	45.5	47.3

The aim was to see how small an amount of bought meal would bring a cheap batch of weaners, all on the small side, to porkers.

Mr. Stephenson considers that with his saving on meal from the start, his pigs were the only pigs that left a profit at the prices ruling on the day of the sale."

* * *

"The traditional use for Comfrey is as a scour preventative in pigs, and it is still in use casually on some farms where there is no knowledge of it other than tradition. The modern system is to feed 2-3kg of fresh leaf to the sow while she is in pig, not altering her diet greatly, saving a little on meal. Her mineral needs are high at this time and she likes the Comfrey. The ration is continued and increased after farrowing, giving her plenty of young Comfrey leaves. A sow will eat Comfrey at any stage of growth and very small piglets will eat fresh Comfrey as their first solid food. This reduces their demand on the sow's milk and with a big litter, the runts get a better chance at the teats while their bigger competitors are eating Comfrey. The result is to even up the batch, giving a quick early liveweight gain from suitable vegetable protein with the minimum fiber, the leaves supplementing the sow's milk.

One Essex pig-keeper has used this method for many years, aiming at an average of 18 suckers per litter, by selecting his sows for litter size, and feeding Comfrey at the later period of gestation. He sells his weaners, and more piglets at each farrowing pays him well, all making a good price as a uniform batch.

The second advantage is the elimination of the risk of scouring at 10 days old, and at periods when the sow's milk alters in richness, or if there is any change of diet. It also seems effective against scours caused by the coli Bacillus. The Comfrey ration to the sow herself prevents after-farrowing scour, and the use of Comfrey hay for sows in winter has many times over justified its making on this account. It is reported that a farmer named MacDonald made some in his oast house in 1953 before hop drying (he got 21% protein, 11% fiber, by this method), and cured a sow with a bad attack of after-farrowing scour in January. He fed 2.7kg of the dry Comfrey hay daily plus water only, as a sole diet for three days and cleared up the trouble. Pigs of all ages will take Comfrey hay greedily, or at 5% moisture it can be hammer-milled as meal and fed with suitable balancing feeds. All this rests on practical experience, with nothing weighed or recorded, but from the consistently successful treatments of scouring over the past 100 years and the feeding advantages that have produsedd good results over the same period we can be more certain of its value for pigs under modern conditions than with any other farm stock."[11]

These English experiences have already been confirmed in Japan.

Like most other countries, Japan serves up pork and bacon with far too much fat in proportion to flesh. And who amongst us has not had the popular "curry-rice" when pork fat is the only meat in the curry? This indicates bad feeding of pigs. Concentrates usually have a far too high proportion of carbohydrates. It is cheaper than protein. But the best pork or bacon can never be produced by that method.

A diet of farm grown Comfrey leaf will remedy this. In pork and bacon raised on 80% Comfrey the ratio of flesh and fat will be balanced. The porkers will come to market with a bloom that marks all first class pigs properly fed, and the flesh-fat ratio will be such that one can eat it all. Comfrey diet will help also after castration of piglets,

who recover after the operation without any check to their growth.

We want to emphasize the method of feeding fresh Comfrey leaves to young suckers at the earliest possible time. They will take it very young, even at a week old. And once they start eating it all problems of scours will end. Comfrey is both food and medicine. Not only will they thrive on the additional intake of protein and Vitamin B12, the Allantoin will keep the whole digestive tract free from irritation, and scours will be unknown. The runts catch up to the advanced piglets, and the sow's continued feeding of a large litter is possible. Another HDRA report gives the following data from the year 1960.

"The first trial involved four pigs only, whose live weight averaged 45kg. These were each fed 1.3kg of fattening meal per day with as much Russian Comfrey as they would eat until time of slaughter for pork at 66.5kg live weight. The average live weight increase was 2.5kg in 38 days—each pig eating 50kg of fattening meal and 100kg of Comfrey. Live weight gains were similar to those in the first trial, which suggests that 1kg of fattening meal may be replaced by 5kg of fresh Comfrey. In addition to the basic meal ration, a pig seems capable of eating a maximum quantity of Comfrey per day equal to approximately 10% of its live weight. Thus a 40kg porker will eat about 4kg of fresh leaf."

Dairy Cows: One of the best reports published anywhere on Comfrey as a food for dairy cows was issued in 1962 by the Meiji Milk Producing Co. on results established at the Saku factory in Nagano Pref., Japan. This has been translated and this year it went on world circulation as No.3 Comfrey Report, issued by the HDRA.

No3 This report established without doubt the superiority of Comfrey as a food for milk production. It also establishes its palatability to cows, and the suitability of Comfrey as farm grown stockfood. Similar reports have come from Kyodo Milk, from the Snow Brand Plant and Seed company of Hokkaido, the Japan Fodder Plants Research Association, the Hokkaido Azuma Agricultural Development Office, the Nagano Cattle Breeding Association and others.

Occasionally one hears the comment, "Cows do not like Comfrey

much". When this is written, it is by someone who is not a dairy farmer, and who knows very little about Comfrey.

Let us go back nearly 100 years, and we read, "It is splendid, fed chaffed with hay, and produces very high quality butter, and does not taint the milk or cause bloat." This experience has been repeated innumerable times through the century, and is being borne out now all over the world. Mr. Savage, of Victoria, the dairy farmer with wide experience who supplied our first Comfrey for Japan, has grown Comfrey for his cows for 10 years, and he reports better health of his cows, better milk (especially in non-fatty solids) and higher yields.

The dairying industry in Japan is relatively new, and many farmers have taken up one or a few cows as a sideline to supplement farm income. But many of these cows are poorly fed, fed on concentrates quite unsuitable to the cow's digestive system, which basically requires grass, fresh and green and/or as hay. The cow is really a most efficient machine for food production, but their feed must be good to give good results. What percentage of cows in Japan have gone on producing high grade milk in good quantities through 8-10 lactations? Yet a good cow should do this if properly fed, and the high cost of cow replacement is saved to the farmer; otherwise dairying is not profitable.

In this respect Comfrey can do most to help. Fed 50x50 with grass or oats or corn, Comfrey either fresh or dried will provide complete balance, and yield highest results in quality and quantity of milk. It is sometimes fed wilted to cows, rather than freshly cut. What is cut today is fed to the cows tomorrow, but once cows are accustomed to it they relish fresh Comfrey.

The reason for this is the high protein, mineral and vitamin balance of Comfrey. They have a much keener sense of good food than humans, their noses being their guide. Cows, like human beings, should get their food needs, including vitamins and minerals, in their normal food intake, not by supplementary synthetic tablets or powder or concentrates. The health and functioning of their whole digestive apparatus depends on this. And although cows may appear to benefit from special supplements in prepared meal, if the cow economy is geared to maximum production over the maximum number of years,

they must depend on natural food, and not on additives. Nor should production be forced by the over-feeding of concentrates. This is a false and costly economy.

Louis Bromfield has said, "At Malabar (his famous organic farm in the U.S.A.) there is a minimum of grain feeding or of any forcing of the cows to make records. Cows are treated as the ruminants they are, with stomachs designed to digest and utilize grasses and legumes and not heavy starchy grains. They are fed all the grass and legumes they will eat in the form of grass, hay and silage".

This is the basic rule for feeding cows. But the grasses fed to cows must be top quality to get top results. Comfrey is top quality. Not only does it give the high protein they need for high milk yield, but it adds the Vitamin B12 and minerals that are needed for top quality milk.

Bromfield says further, "With regard to the Vitamin B12 content of milk, the experiments conducted at Missouri University have so far been nothing short of startling, the content rising on an average upon the feeding of trace elements from 0.006 content to a content of 0.043. This is interesting in view of the now firmly established fact that traces of cobalt are necessary for the production of Vitamin B12. It also indicates a notable difference in the nutritional quality of milk from cows fed upon good forage from good soil as against those fed on poor forage from deficient soils, and especially those fed from soils deficient in trace elements, notably cobalt, copper and manganese".

Comfrey does not grow well in poor soil. It will not do well without adequate supplies of micro-elements, and it must have Vitamin B12 in the soil, which argues the presence of cobalt.

The reason for the need of cows for good hay along with the Comfrey is the low fiber content of Comfrey. Cows being ruminants, they must have high fiber. But Comfrey is the richest food source to go with the hay. It is rich in calcium, another must for cows; they need calcium in considerable quantities naturally in their food rather than as a supplement. Comfrey contains about 2.5% calcium and is also high in potash; by itself it would tend to be too loosening of the bowels for cows, but is ideal for horses and makes Comfrey very palatable to

them. Feed Comfrey either fresh or wilted 50x50 to cows for best results. This means about 25-30kg of fresh Comfrey leaf per cow per day, the yield of 6-10 plants.

Cows will bloat on fresh clover but not on Comfrey. Too much clover also taints the milk, thus reducing palatability. The Allantoin in Comfrey, which is also a healing agent that will keep the young stock free of stomach troubles, scours, etc., saves the cows from bloat, no matter how much they eat.

Raising young stock: Replacement calves are usually raised by the dairy farmer. But because he must have the milk for the dairy company, calves are often poorly fed. Here Comfrey can help. In some countries, skim milk is the main food of the calf from the time it is off the cow, as the butter fat is the farmer's income. It is at this period that calves suffer from scours, when the mother's whole milk is no longer available to the young.

From the very beginning, Comfrey can be fed to calves. One method is to crush the fresh leaves and add the juice to the milk at first for baby calves. From that stage they can go on to chopped up leaves in the milk, and many calves will start eating the fresh or wilted leaves direct from 10 or so days old. The cow's milk for sucking calves contains Vitamin B12. The early milk also contains Allantoin up to .18%. These two elements are both in Comfrey leaves, so if fed on Comfrey, calves taken away from the cows are not deprived of these two elements essential for their vitality and growth and freedom from sickness. Comfrey will cure scours, but calves raised on Comfrey in this way never get scours, which basically is caused by deficiency. This applies to young pigs, calves, foals and chickens. It has traditionally been one of its most valuable uses with young thoroughbred foals whose value is far greater than pedigreed calves. This guarantee against sickness has been one of Comfrey's most valuable contributions to stock raising, the Allantoin in Comfrey curing irritation of the digestive tract, or preventing it totally.

Another scourge of the dairying industry is mastitis. Its ill effects come through to consumers of milk in various ways. Cows are treated with penicillin for mastitis and the consumer frequently gets small

doses of penicillin in the milk from cows so treated. This in turn builds up in the consumer an allergy to penicillin in some cases, and in others, makes them immune to the benefits of penicillin if it is necessary to use it in illness. It also seriously interferes with the normal lactic acid bacteria, and milk so affected quickly goes sour.

Comfrey comes into the picture this way, that cows fed regularly on Comfrey have been found to keep much freer from mastitis that cows without Comfrey. This is understandable because of Comfrey's power to make animals (including man) more strongly resistant to infection. It would be too much to claim complete immunity from mastitis among Comfrey fed cows, but the reduced incidence of it with such cows greatly strengthens the case for Comfrey for cows.

Beef cattle: No real tests have yet been carried out on the use of Comfrey for beef cattle, but based on the analogy of dairy cows, pigs and horses, one would favor this as one of the principle uses of Comfrey in beef production. Japan's beef population has greatly increased, and while the reputation of Japan's beef is justly unrivalled in the world, the cost of production of the best beef, Matsuzaka and Kobe, is such that it puts it in a luxury class, out of the reach of most people for regular use.

Here is a farming problem of first dimensions: To produce first grade (not special) beef at a price suited to the pocket of the average, and still give the farmer an adequate return for his investment, especially of labor. The condition of a good animal ready for the market can be judged partly by the sheen on its coat. This result of feeding Comfrey is very clearly seen in pigs, cows, and horses. The bloom even on the feathers of a hen or on a caged bird is better with Comfrey. And we have on the file a letter from one Comfrey enthusiast in Japan telling of an old hen that grew new feathers and started to lay again after being fed Comfrey.

We find that the medicinal and cosmetic use of Comfrey results in a better, clearer, healthier skin, a woman's pride, an analogy that suggests that the bloom looked for in a steer ready for the market will come from Comfrey used as a main element in the feeding of beef cattle, and prime beef will cost much less to produce than it does now.

Race horses and riding hacks: In reading the history of Comfrey we see that racing stud farms, the thoroughbreds of England, played a big part in preserving Comfrey when it was almost forgotten. The Mr. Stephenson referred to earlier in this book in relation to pig farming, and whose name is associated with one strain of Comfrey (Bocking No. 14) had the Hunsley House stud, which when Comfrey Report No. 1 was prepared (1955) housed stallions worth upto £ 30,000 each and £ 250,000 worth of racing stock. He had the oldest continuously cultivated plot of Comfrey in Great Britain, used for the racehorses and for pigs.

Another traditional field where modern experience supports the past is with horses; today, not the working animals of the 1870s, but racehorses, stallions, riding school hacks, hunters and show jumpers. In 1953 E.V. Stephenson set out to repeat the experiment of the Rev. E. Highton of Bude in 1875, who fed Comfrey ad lib. instead of hay, and halved the oat ration to his horse, which was the then equivalent of a small car. Mr. Stephenson fed Tom Atom, a four-year-old gelding used as a trainer's hack and hunter, on about 2kg of oats plus 18.5kg of fresh Comfrey a day, the amount an adult horse will clear up easily. Tom Atom kept in splendid condition; he managed two days a week hunting, in addition to his normal work, while fed on the late cuts of Comfrey that continued into December.

The saving on hay, including the extra labor cost, amounted to £ 2.00 a week in 1953, and the horse was worked harder than he could have been on grass alone, and kept in better condition. The higher starch content of grass means that horses on grass run to fat. One does not feed a horse for liveweight gain or milk yield, but for energy and speed. In 1954, the experiment was repeated with the same success with Woodcote, a stallion valued at £ 12,500. Horses and show jumpers in training received the traditional allowance of 2kg of Comfrey a day, which keeps their dung in the condition known as "right" and supplies their mineral and Vitamin A needs, the "green meat" in the horse's diet, for which lucerne sells at a very high price.

The Comfrey ration is a normal part of the diet and in no way increases the speed of a horse; it may, by removing the risk of some digestive disorders, make him less likely to be "scratched" from a race,

but speed is in the breeding, skill of the jockey, and many other factors.

Mares and foals in the spring receive approximately 6kg a day, the quantity that long experience shows removes any risk of scouring. The value of the animals concerned averages ₤ 250,000 a year per season, apart from the stallions, which are given about the same ration at this time of year. In the spring no question of money-saving arises; the need is to give expensive horses the best, and to insure them against trouble. Both the Allantoin and the minerals are of real value at this stage.

Summer production means reduced costs, and the costs of all concerned in horse-racing need as much attention as those of the normal farmer. Stallions are stall-fed, the paddocks used for exercise only, and their owners, and owners of riding schools, with fields packed with horses far beyond the standards of the grassland dairy farmer, all expect to have to buy hay in the summer. This hay needs qualities that are measured by smell and feel rather than analysis. Good hay starts as good quality grass and then matures in the stack, with certain chemical changes, including a relative rise in the mineral content from the decline in other substances. Such hay brings very high prices.

Fresh Comfrey, it seems, acts as a balancer for a lower-grade hay, or a substitute for the very expensive type used by trainers and breeders. In training, concentrated foods are required, but for the maintenance of condition and health and normal work the Comfrey allowance can be increased. It can be said that 90% of horses take to Comfrey at once; others may take a bit of coaxing but all like it when they are used to it. The method is to chaff it and feed with other foods until they become familiar with the unfamiliar taste.

Cutting Comfrey for cows and horses should be done at a more mature stage than for chickens and pigs, between 28 and 35 days being appropriate according to the season. This means higher fiber.

Just a word on the palatability of Comfrey. Stock do not usually eat native Comfreys. It is the well-grown hybrid that is most palatable,

being more suitable than both its parent plants, Officinale and Asperrimum. If one reads of stock not finding it palatable it suggests that attention should be paid to the method of cultivation. In tests conducted so far, all stock: cows, pigs, chickens, and race horses have taken it readily, even eagerly.

Comfrey for Zoos: Reference has already been made to the Comfrey plantation at Whipsnade zoo in England, comprising 2 1/2 acres (1 hectare, with some 13,000 plants). One of the major problems of a zoo is to maintain an abundant supply of fresh and if possible, health protecting grasses for the herbivorous animals: elephants, hippos, rhinos, giraffes, buffaloes, deer, etc. In their wild state they can roam at will and seek out the fodder they need, but caged they must have special attention paid to their health needs.

Comfrey has already proved its value and will continue to do so. Over the past few years many zoos in Europe have established plantations of Comfrey to help them solve their fodder and health problems with their big herbivorous animals.

Geese, Ducks and Turkeys: Geese in particular are grass eating birds, and do very well on Comfrey, but other water or semi-water birds also consume large quantities of grass, and here is a field for the goose and duck farmer. One does not see this type of farm in Japan, but in Hong Kong there are hundreds of such farms, as there are in many other countries, where ducks and geese are bred for the table. These birds usually eat the young grasses by the edge of the water, when the protein in high, and this suggests that Comfrey could well form a large part of their diet. Chopped up and fed with the usual mash, Comfrey can save the farmer much of his outlay for food by supplying up to 90% of the bird's needs.

On turkeys, one report published in Japan says: "The problems of raising young stock in both categories (chickens and turkeys) and especially turkeys, which are so hard to bring to maturity, can be largely overcome with Comfrey because of its high mineral and medicinal value. All such stock have shown a marked preference for Comfrey when given free choice, refusing to eat young grass until all Comfrey was consumed. Comfrey is favored over brassicas both by the

stock and the farmer, by the stock for its flavor and food value, and by the farmer for its reduced labor. Once the Comfrey is established it is there for a lifetime.

Rabbits, Chinchillas & Other Fur-bearing Animals: Rabbits can be fed 100% on Comfrey. One report on our files, prepared in Japan, points out that rabbits so fed put on weight faster, and the fur improves in quality. Relating this to the striking case of chinchillas, reported under the chapter dealing with Vitamin B12 in Comfrey, one can see the reason why. A wild animal has access to natural sources of food which it instinctively seeks, but a caged animal is restricted by its cage to the food given it, which is often deficient in essential nutrients.

The chinchilla, a vegetarian fur-bearing rodent originally from South America, is bred and raised in a cage for its fur. In the winter, it was found that the caged animals were suffering from a deficiency, and would eat their own droppings, a clue to their vitamin needs. It was found that a small section of Comfrey leaf each day was enough to stop their craving for vitamins in the winter. From this developed the first Comfrey leaf tablet, prepared merely by powdering and compressing the leaf dried to 5% moisture and feeding the tablets to chinchillas. It cured all symptoms of vitamin B12 starvation, and kept the animals in vital health with improved fur.

The inference is clear, and to the rabbit farmer this can mean a big increase in earnings from the raising of rabbits for food.

Caged Birds: As one would logically expect, good reports have come in on the value of Comfrey to caged birds which are subject to a variety of deficiency diseases. Feather plucking, common to chickens and other birds that are shut in and therefore deprived of their natural mineral and vegetable sources of health, is a deficiency symptom that Comfrey will relieve, and the tender young leaves of Comfrey are readily eaten by birds in cages in preference to other greens.

Sheep and Goats: Experiments with goats in Japan have shown that goats do well on Comfrey and eat it readily, but of course like all such mammals, they need an abundant supply of other fibrous grasses such as hay. An interesting experiment was recently conducted by the

Department of Agriculture in South Australia, feeding sheep on a mixture of Comfrey and straw, not hay, be it noted, just dry wheaten straw. The sheep were fed in the ratio of 1kg of dry weight Comfrey to 1.5kg dry weight of straw. This was found preferable to the usual 1kg of oats with straw. The Comfrey was cut and wilted before feeding, and showed that the Comfrey promoted digestion of the straw, and is a valuable contribution when sheep are grazed on wheat stubble, as they often are.

One can justifiably claim in summary that there is no fodder plant so versatile as Comfrey in its application to the farm need for a farm-grown food supply.

Elimination of Comfrey Plants: In the unlikely event of them not being wanted.

The cheapest and best method of dealing with Comfrey, like any other farm crop, is to learn to grow and use it well. But sometimes for some special reason it may be necessary to clear the ground, and the elimination of Comfrey is not easy, with the roots going so deep. The following methods can be recommended. (Comfrey Report No. 1)

"It should be said that no farmer who is growing good Comfrey well wants to destroy it, but it is sometimes necessary to know these details. Because the roots are stronger and harder to kill than those of other crops, like those of a horse-radish, and as killing methods are little known, these are given here.

The surest and easiest method is to wait until the young leaves can be seen early in the spring, or at any time before they go dormant, drive a spade through the main roots just below the surface; the aim is to expose the white root centers where these are gathered together below the crown. Throw the tops to the pigs, or leave them to wilt until they can be burnt. On each cut surface put about a teaspoonful of Sodium Chlorate, and then merely leave this to rot the whole root system. Because the root system is large, the weed-killer is greatly diluted, and after three months or so, the land can be cropped normally. This is cheaper and far more effective than just scattering Sodium Chlorate on the leaves.

The system used by the German peasants, who kill their plots after transplanting offsets (they leave these for ten years only), is to fold pigs on the crop. This is the best farm system. Put the pigs on about May, when the growth is high, using them unrung and cutting down their food until they root well. Use either tethers or an electric fence to keep them on the plot all the summer, or give them a series of spells on it; they will not only get out the roots they can see, but they will eat the seakale-like young growth of the plants, which pigs detect by scent. There have been many cases of attempts at pig folding, and all have ended in the destruction of the crop."

Appendix I

First World Comfrey Conference

In 1974 the First World Comfrey Conference was held at Portland, Oregon, U.S.A. It marked a high point in the promotion and understanding of what is possible with Comfrey as a stockfood and medicinal plant, and the relationship of this to organic agriculture. These two issues go hand in hand. The panel of speakers was very representative and had the organizing of the Conference been adequate, with a proper follow up, there could have been a world-wide expansion of the knowledge and concepts represented and presented by the speakers.

One positive product of the Conference was a brief 110 page booklet by Lawrence Hills of the Henry Doubleday Research Association, compiled and written for the First World Comfrey Conference. It is titled, "Comfrey Report—The story of the world's fastest protein builder".

Appendix I in the book is "A study of the Alkaloids in Comfrey", which, in conclusion says explicitly, "Thus from these experiments and other considerations it may be concluded that the use of Comfrey as a food for mankind or animals does not present a toxic hazard from alkaloids, there being no evidence of acute or chronic hepatic reactions... From this (evidence from experiments) and the much lower content of alkaloid in herbage and tea, together with the lack of any toxic evidence (from ingestion of Comfrey leaf) in livestock and the very low level of toxicity of the alkaloid itself, it may be concluded there is no toxic hazard from the use of Comfrey herbage and tea". No evidence has ever been produced that refutes this statement.

Appendix II of the 110 page book is "Practical Protein Sources in Primitive Tropical Areas", by John de Romanett, B.A.M.D. of Pendleton, Oregon, U.S.A. His article says, "In summary, one can state that the extraction of leaf protein is relatively simple, and with proper equipment and training, much of the protein needs of malnourished people can be met by utilizing leaf products that grow in their local

area. Out of about 300,000 plant species only 20 or 30 are used for major food crops. Concentrating proteins from green plants by mechanical methods indicates the possibility of using many other plant species, especially in primitive areas where there is so much protein malnutrition, and particularly in the wet tropics where high protein foods are scarce". [1]

This is a field that calls for action, not based on its profitability in terms of commercial gain, but for its benefit to the human family, where modern science and technology can prove their true worth.

The other important point that needs to be specially stressed in reference to Comfrey is that the use of Comfrey does not require the extraction of the protein for use as human food. The whole leaf, dried and compressed into tablets, can be used anywhere as a concentrate of protein (averaging 30%).

It is interesting to find among the papers (which I got under FOI) used as the basis for restrictions placed on the use and availability to the public of Comfrey and Comfrey products, is a paper published in 1976 in "Crops and Soils magazine", written by Richard H. Hart, an Agricultural Research Service agronomist. The article carries the title "Comfrey, Miracle or Mirage". The dry matter yield of Comfrey is compared with the yield from alfalfa, red clover, timothy grass and corn, based on reports from three states in America and four other countries.

Putting aside the rather scornful and very inadequate statements about the work of Henry Doubleday and his associate Thomas Christy, it goes on to talk very inaccurately about Comfrey, with no understanding or differentiation between the various types or their history. Nothing in what has been written by Hart refutes the claim made by Lawrence Hills and confirmed by wide experience, that Comfrey is "the world's fastest protein builder". It raises the problem of nematodes—a subject mentioned in passing in my story of Comfrey in Japan, which is no problem if the soil is treated properly, but is a problem in over-chemicalized soil where the one measure of success in production is big yield of grain or crop, and maximum profit for quick turnover. That

is not how Comfrey is grown or used. The use of chemical fertilizers, insecticides, poisons to kill nematodes, etc. destroys the soil structure and demands the ever increasing use of such methods, until now, when "P for Pesticides", as one recent publication calls it, has become an expanding problem.

Mr. Hart is only superficially aware of the value of the two elements in Comfrey, Vitamin B12 and Allantoin, which make it unique, and the balance of amino acids constituting a really high protein. On the question of alkaloids he also makes a superficial and very inadequate comment that makes the whole article misleading and irrelevant to the main issues.

An Evaluation of the First World Comfrey Conference in Relation to the Work of HDRA and the Future of Comfrey

The First World Comfrey Conference, held at Portland, Oregon, U.S.A. on August 18 and 19, 1974, marks a significant stage of progress in the promotion of Comfrey as a major source of food, especially as a protein source for an increasingly food-hungry world. In spite of the weaknesses of organization and management of the Conference and the absence of a follow-up, and the now patent inadequacies of the organizers, the nett outcome is a real plus, and many criticisms notwithstanding, one most positively appraise the work that made the Conference possible. Even to have brought together onto one platform the panel of main speakers is of real value, which incidentally also brought together for the first time three of the veterans of this cause, Lawrence Hills of HDRA, J.P. Phillips of what was then Rhodesia, now Zimbabwe, and myself. It also meant the coming together of many other valuable people working in the field of organic agriculture, the results of which must not be lost.

But most important, the Conference brought Comfrey to the notice of many more people, and there is little doubt that subsequent events and happenings that are now moving in the USA could lift the Comfrey program there to an entirely new phase of expansion and use, and

greatly stimulate the related subject of organic methods of agriculture, which in turn, will be a major service to mankind if it is handled properly. I am optimistic that this can and will take place.

Following the Conference, I quickly established contact with FAO in Rome, where I had already introduced Comfrey in 1960, and my report of the Conference and Mr. Hills' special Comfrey Report, which is unlikely to have been written and printed except for the First World Comfrey Conference, were placed before both the Secretariat of the UNO Food Conference in Rome, November 5-16 and the Food and Nutrition Section of FAO itself. This could lead to new and most valuable developments if the necessary promotion can be done. The same reports are before the Australian Government, in the hands of the Minister of Agriculture through the Deputy Prime Minister. These are all plus values from the First World Comfrey Conference. I could add others, but this will suffice.

Some consideration should be given now to the relationship of movements in the USA, here in Japan and elsewhere, with the Henry Doubleday Research Association. The important point in this relationship is that it is the work of Lawrence Hills and the HDRA and not the organization that must be carried on in other places, and that new stages must be reached by building on that work. It is not the organization, the forming of branches of the HDRA in the USA or here that is necessary, but that the work should go on. And it would be sheer egotism to suppose that no one but ourselves can carry on this work. So the organization of HDRA and/or its branches in other countries is unnecessary and even unlikely to succeed. The HDRA is an especially English structure and it could even lead to another Boston (Comfrey) Tea Party if the attempt were made to impose it on an American foundation. It must be an essentially USA structure, built on the HDRA foundation.

It is the work, I repeat, not the organization, that they there and we here need. The greatest tribute that could be paid to Lawrence Hills for the painstaking and time-consuming work he has done through the years is to build on the foundation he has laid, and see to it now that Comfrey is given to a hungry world, and among the richer nations, to

a really sick world. So I agree entirely with what Lawrence said in his letter to me of February 13,

"We have no wish to form anything in the nature of an American group or indeed a Japanese one because we have no control over anything over these great distances and we could not know what was being done in our name."

As I said in my speech at the Conference in Portland, a new and younger generation must begin to take over from us, even though, with the help of our daily intake of Comfrey, we hope to be able to work in this field for many years to come. But others will go on from here. And whether we like it or not, Comfrey will be commercially exploited, a word I use in its best sense and not with political overtones, for, as I said to Lawrence Hills in a recent letter, "that's how the business of the world goes on".

What HDRA should seek and what we are ready to help find, is an expanding corresponding membership of the Association all over the world. This direct contact will be of utmost value in the years to come, even more than it has been in the past, and I recommend that the HDRA committee take this up and promote and build it.

The other need, as I see it, is for an affiliate membership for organizations. I have already put up the idea of an International Comfrey Growers Association—probably a "Growers and Users Association" and if this succeeds in any degree, we should be able to be recognized officially as an affiliate, not a branch, of the HDRA. Maybe the Constitution of HDRA already provides for this, but if not, some consideration should be given to making such an arrangement possible. It seems likely that some such non-profit organization could soon emerge in the USA too, promoted by some of the commercial people of goodwill who value the work of movements like the HDRA.

That euphemism, if that is really what it is, rather than a rationalization, of calling a non-profit organization such as the HDRA a "Charity", I find rather distasteful, for I have an inveterate dislike of Charity and Charities, though Caritas I value highly. But I suppose that's the

way the law has it. Nevertheless, I suggest that HDRA should be spoken of as a "non-profit organization", especially in dealing with organizations in countries where "Charity" is likely to be grossly misunderstood.

Now what of the future of Comfrey? In a word, it has come to the stage where it should "take-off", to use a commercial term. It can never be confined from now on within the limits of research on a non-profit basis. It must now be regarded as a basic commodity within the food economy, and be treated as such. And as this takes place, let us ensure that the pioneering work of Lawrence Hills and the HDRA be given its rightful place. I hope to see it play a major role in overcoming this food shortage of the third world, that vast mass of our human family who face the reality of hunger and deprivation in this world of plenty, where we ourselves have never been hungry.

In closing this brief review of the First World Comfrey Conference, may I pay a tribute to one who more than redeemed the mistakes, to use the kindest criticism, of some of the organizers. I refer to Mrs. Beth Setzer, long a friend of the Hills, and now a friend of us all. Without her help, both financial and personal, there would have been no Conference. With untiring Comfrey energy she carried enormous responsibility and helped make the work of the Conference and the visit of Mr. Hills a remarkable success, and will, I am sure, greatly help the follow-up work that now has to be done. Her work in this field has already begun.

August 1974

Appendix II

Stockfood "Comfrey". Cultivation and Feeding Test

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1. Preface

The key to stockbreeding economics in Japan is in the problem of stockfoods. Japan at present depends mostly on overseas sources of stockfood, and only partly on farm-produced stockfood. Herbivorous animals such as milk and beef cows supply important protein and fats for the Japanese people. Pigs and chickens, which are not normally regarded as herbivorous but need grass, are also important sources of food for the Japanese.

If imported stockfood can be replaced even partly by Comfrey and if this new stockfood is superior to older stockfoods in nutrition and economics, it will contribute not only to the saving of a tremendous amount in the national budget but will also make a major contribution to improved nutrition for the Japanese people.

From these points of view, we tested the cultivation of Comfrey, storing, feeding to milk cows and to pork pigs, at the suggestion of Mr. Furuta, chairman of Japan Univ. and with the cooperation of Mr. Shoriki, President of Yomiuri.

There is some fear that because Comfrey is a new stockfood, and with exaggerated advertisements done by some questionable broker-type groups, some farmers have suffered and have reason for complaint and dissatisfaction, so Comfrey has now come under some criticism.

It was for this reason that Japan Univ. did a small scale first year experiment in 1965. It is not possible yet to reach a final conclusion on the total stockfood value of Comfrey. There is need to do large scale tests and discuss everything fully and scientifically. We present this tentative report on partial results of the first year. It must be added that these tests were done academically. Nov. 2, 1966.

II. Yield, Storage, Silage Making, Nutritional Value

1. Yield: In the spring of 1965 Comfrey was tested at Nihon Univ. Farm for cultivation, fertilizing and management, but in this article we will report mainly on test and yield. About 6,000 Comfrey offsets from Yomiuri land were planted. Planting was completed about the middle of May, 2 months late on standard planting time. Therefore only 3 cuts were possible to the end of Oct. The yield per 1/4 acre (1 tan) was from 5.1-9.9 tons (20.4-39.6 tons per acre). Planted 60cm each way, 1,850 plants per 1/4 acre (7,400 per acre) gave maximum yield (9.9 tons). The figure would be well over 10 tons if we calculate cutting from April to Nov. (2nd year on).

Every year about 10 kinds of stockfood are grown at Nihon Univ. Farm, and except for pasture grass, the period for feeding each kind is about 1-4 months. For example:

		Period
Turnips	Dec-Mar	4 months
Rape	Mar-Apr	2
Rye, wheat	Apr	1
Oats	Apr-Jun	3
Oat silage	Nov-Dec	2
Green cut silage	Jun-Aug	3
Corn (Maize) silage	Dec-Mar	4
Stock beet	Jul-Sep	3
Sweetpotato	Oct-Dec	3
Sweetpotato runners	Oct-Nov	2

For these stockfoods the soil must be ploughed, planted and fertilized every season and the labor needed is great. By contrast, Comfrey can be fed as green feed from Apr—Nov (8 months), and its cultivation is fairly easy, there being no need to plant every year. From the standpoint of labor management we found this very time-saving. The classification of Comfrey type and selection of maximum yield type is left for future consideration. From our observation there are 6 variations of Comfrey type being cultivated in Japan now.

2. Storing

(a) Drying: Storage of stockfood (crude food) is done either dryer as silage, traditionally to be used as winter feed. In the dry storing of Comfrey, it is necessary to use heat to dry it as sun drying is not enough due to the high water content of Comfrey (87%—88%). This takes a long time to develop to the point of practical application, and special drying equipment plus man-power and fuel have to be taken into account.

The making of silage is used widely in dairying, from the standpoint of cost and high food value; Nihon Univ. Farm tested Comfrey by this method.

(b) Silage: Comfrey (leaf and stem) was dried for 2—3 hours under the sun, cut before the first frosts (middle to end of October); it was then cut and mixed with 10% of bran, with a little lactic acid bacteria added and put into the silo.

Because of the high water content of Comfrey and other factors we mixed with bran. Lactic acid bacteria was used to promote lactic acid fermentation.

Two kinds of lactic acid bacteria, Lactobacillus plantarum Orla-Jensen and Lacto bacillus brevis Orla-Jensen, were used. The method is as follows: Mix 800g of bacteria in 40 liters of water and culture for 3 days at the temperature of 30°C (86°F). 10 liters of the culture was used on 3.7 tons of Comfrey + bran and then it was packed into the silo.

The silage was matured for 2 months and proved to be very good in smell and color and in no way inferior to Dentcorn silage. Cows and pork pigs liked it very much.

The analysis of Comfrey Silage done by the Agriculture and veterinary food research dept. is as follows:

Unit: %)

Water	Protein	Crude Fat	Crude Fiber	Crude Ash	Soluble Non-Nitrogenous	Rem.
9.76	9.25	7.77	13.39	23.51	36.32	Comfrey silage

Following is Control using Dentcorn silage analysis. (No lactic acid added)

9.78	12.69	8.73	9.66	24.95	34.19	Dentcorn silage

The analysis shows little difference, and confirms that Comfrey silage is suitable for milk cows and pork pigs for winter feed. Long term feeding test of Comfrey silage will be done later. The volatile fatty acid analysis, an important factor in determining silage value, shows that it is very suitable for stockfood.

3. Analysis of Comfrey leaf and stem

There are much data on the analysis of Comfrey leaf and stem.

	Water	Crude Protein	Crude Fat	Soluble Non-Nitrogenous	Crude Fiber	Crude Ash
Leaf	88.0	3.8	0.4	4.1	1.1	2.1
Stem	87.9	1.5	0.3	4.7	4.1	1.5

Compare with traditional stocks, Ladino Clover and Dentcorn.

Ladino Clover	87.4	3.7	0.7	5.0	1.7	1.5
Dentcorn	86.7	1.3	0.3	6.6	3.9	1.2

This analysis shows that Comfrey is superior in nutritional value to these traditional stockfoods.

In addition, the New Zealand analysis of Comfrey shows that it contains the following elements: Fe (0.016%), Manganese (0.0072%),

Calcium (1.,1%), Phosphorous (0.82%) plus the Vitamin group and other micro elements such as Vitamin B1 (0.5mg/100g), Vitamin B2 (1.0mg/100g), Nicotinic acid (5mg/100g), Pantothenic acid (4.2mg/100g), Vitamin B12 (0.07mg/100g), Carotene (0.170/100g), Vitamin A (28,000 unit/100g), Vitamin C (100mg/100g), Vitamin E (300mg/100g), Allantoin (0.8%). Especially worth noting is that Comfrey contains Vitamin B12 and Allantoin, which make it different from all other stockfoods.

Vitamin B12 is a blood creating substance, and Allantoin is a diuretic and call proliferant. From these facts Comfrey can be considered a medical herb. Further investigation is to be made on it as a stockfood, and its effect on production, etc.

III. Comfrey as Food for Porkers and Meat Quality

1. Palatability: Though the pig is omnivorous, many people do not realize that they eat grass like cows and horses. Many Japanese people do not realize this, but in other countries pigs are fed grass or are raised on free grazing.

Feeding tests done with pigs have shown that grass can replace 30% of concentrated stockfood if the grass is nutritious. Using Comfrey green leaves at Nihon Univ. Farm, pigs took Comfrey as readily as clover. It was very palatable to them. Experiments were done with Comfrey, and comparison made with a control group.

Four pigs were fed 2kg of concentrated stockfood plus 2kg of green Comfrey leaf per head per day. Four Control pigs were fed each 2.5kg of concentrated stockfood only.

2. Increasing weight: A litter of 8 was divided at weaning into 2 groups. For 6 weeks all were given the same concentrated stockfood in the same shed, and were then separated into a Comfrey fed group (1.2kg per head per day) and a no-Comfrey group, for 3 months. (Period of test June 30—Sept. 30, 1965)

The following tables will show that the weight of the Comfrey group

at the start was less than the Control group (3.6 kg less per head average). But after the fattening test, the growth of the Comfrey group had conspicuously improved, and average weight was considerably heavier than the control group. They outpaced the Control group by an average weight increase per head of 5.6kg.

	Comfrey Group	Control group
Average weight before experiment	38.6kg	42.0kg
Average weight after test	90.7	88.6
Average weight increase	52.1	46.5

It is especially worth noting that the Comfrey group included scour pigs and under-nourished pigs at the beginning, but they quickly recovered their health and weight during the 3 months on Comfrey, and by the end of the test they surpassed the weight of the control group. It can be assumed that this is due to the medicinal value of Comfrey, but it was not possible to analyze the reason for the improvement.

3. Yield rate and quality of flesh: Yield of flesh and weight of offal are given in the following figures. There is no significant difference between the two groups.

	Comfrey Group	Control group
Yield rate	65.1%	66.5%
Offal weight	19.0	18.5

If the period of the experiment had been extended, other significant data may have emerged.

On quality of meat from the standpoint of fat and lean, color of meat, flavor, no difference could be detected by experts.

The conclusion is that feeding pigs with Comfrey rather than on concentrated stockfood alone is an advantage and it is possible to replace concentrate with Comfrey at least 30%. On this point alone it is a valuable reduction of costs.

Comfrey will be tested on brood pigs and the results on baby pigs examined at Nihon Univ. Farm in future tests. But the most important

question is the use of Comfrey in pig raising to solve the stockfood problem.

IV. On Milk Production: Cows.

1. Palatability: Changing to a different stockfood for cows, however good its nutritive value, is difficult. Cows do not like to change. Comfrey green leaf was fed to 34 milk cows, of which more than half at first were reluctant to take Comfrey. But fed regularly and increasing the quantity steadily 5—8kg a day, all cows were taking it eagerly in 5—7 days. By this time, some were eating up to 60kg a day.

Palatability to a cow is influenced by the degree of production of suitable microflora in the rumen of the cow. When cows are fed the same kind of food every day only those microflora which are suitable to break down and ferment the food are propagated. A sudden change of stockfood means that there are not enough microflora in the rumen to deal with the new food. Therefore in changing the diet, a small quantity must be given for upwards of a week, otherwise cows have no appetite for the new food and they may suffer scours.

This is the reason why almost half the cows did not start eating Comfrey at once. But given a small quantity at first and increasing a little day by day, all cows without exception took it. So reports that Comfrey is not palatable to cows indicate lack of understanding of feeding methods.

2. Milk production: However nutritious any stockfood may be, if it has a bad affect on milk production, it is unsuitable. At Nihon Univ. Farm a short test was done in summer, July 1—Aug. 15, 1965, using prepared stockfood plus Comfrey, with a Control group for comparison. The purpose was to test the effect of Comfrey on milk production.

Two cows comprised each group. The Comfrey group was each fed Comfrey 30kg, (Maize) Corn 20kg, Concentrate 1.5kg. The control group was each fed: Beet 20kg, (Maize) corn 30kg, Concentrate 1.5kg.

All cows were near the end of their lactation period, just before

drying off, so milk yield was low, averaging about 9kg (approx. 2 gallons). The test was done in the middle of summer and the period of test was short (1.5 months).

Under the limited test it is not possible to establish a strong conclusion, but it is to be noted that milk production of the Comfrey group did not suddenly fall off but maintained an average higher level. It shows that even with this short test the Comfrey group produced better. The indication is that if the test had been conducted when the cows first came in and continued through the dry season, a conspicuous difference would have been seen. If crude stockfood had been completely replaced by Comfrey there could have been an even greater difference. This would have meant a great saving in stockfood costs.

V. Other stock. So far Nihon Univ. Farm has done feeding tests with Comfrey only with pigs and milk cows, but Comfrey is also being given as green food to our poultry and has proved particularly good for egg production.

There is one example also with race horses, given for further reference. At one stable at a racecourse, Comfrey is being given to about 10 horses now in training, and it has been proved that horses like Comfrey very much. Comfrey green leaf was given at the rate of 3kg a day per horse and the result observed for 1 month. The trainer reports that the horses to which Comfrey was given increased in muscle suppleness and were able to race more often than before. Horses that usually raced twice a month were able to race 4 or even 5 times. Some horses raced 5 times in one month and won. Heat dried Comfrey is being prepared and will be used for winter feeding.

While it is too much to claim that Comfrey is effective to improve racing form just from this one example, it can be said that even a sensitive animal like the racehorse does well on Comfrey.

V. Conclusion

We started testing the new stockfood Comfrey on the suggestion of the chairman of Nihon University, Mr. Furuta, and Mr. Shoriki

(President of Yomiuri). We did cultivation, storing and feeding tests for milk cows and pigs. The following summarizes the first year's observations.

1. There are 6 or so variations of Comfrey type used in the cultivation test; they produced 5.1—9.9 tons per 1/4 acre in 5 months. Those planted 60 cm each way, 1,850 per 1/4 acre gave maximum yield.

2. Comfrey can be given to milk cows and pigs for 8 months as green feed from April to Nov. in Japan. There are no bad effects on productivity.

3. Comfrey green leaf fed 1.2kg per head per day to pigs gave good results in weight increase, yield of flesh and quality of flesh. Concentrated stockfood can be replaced by at least 30% with Comfrey.

4. 30kg of Comfrey (green leaf and stem) average per day per head was fed to milk cows. One advantage is that Comfrey can be fed to cows over a longer period per year than Dentcorn (Maize), with good comparative results in milk production.

5. As winter feed, Comfrey silage is liked both by pigs and cows, and the result with these animals is good.

6. No tests were done for poultry or horses. Comfrey was fed as green food to poultry extensively with good results and even a delicate animal like the racehorse likes Comfrey.

From our results, we conclude that Comfrey as a stockfood for milk cows and pigs, though needing further tests for conclusive results, has shown good results so far on the productivity of the animals.

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発行　アンドルー・ヒューズ
Andrew Hughes
7/7 Woodside Ave.
Ringwood, Vic. 3134
Australia

発売　三友社出版
〒112 東京都文京区音羽1—19—23
電話 03—3946—0285

印刷　光陽印刷株式会社

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