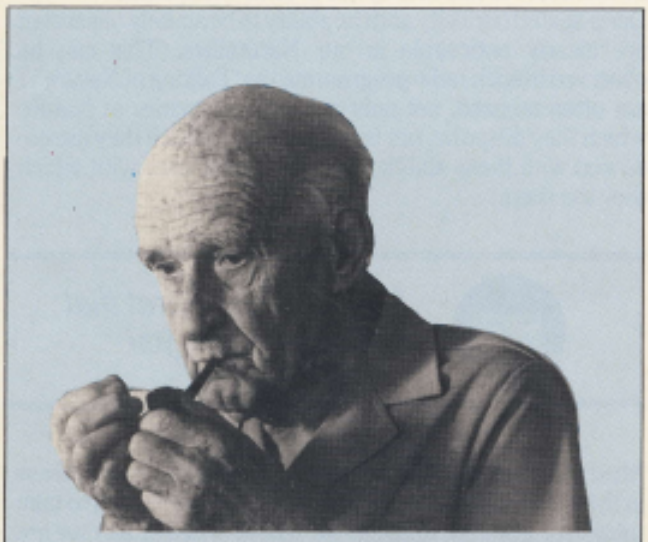

Dr Fox was born in England and obtained a MSc from London University. He then joined the South African Institute for Medical Research (SAIMR) and soon afterwards was awarded the DSc degree from London. He died on 7th November 1982 at the age of 88, still working at the SAIMR as Research Officer Emeritus.

He was a humble and compassionate man who saw no division between the sacred and the secular: the secular had a sacred overlay and the sacred influenced his research life.

He was committed to research for the benefit of people, especially the impoverished. He did not seek fame, but his work was recognised world wide.

He was the first in South Africa to carry out extensive food surveys and to delineate numerous biochemical and metabolical aspects of diseases of under-nutrition and over-nutrition, making major contributions on scurvy and obesity.

Throughout his career he published a great deal. After 50 years of intermittent work, he recently published a very well received book, 'Food from the Veld', which describes hundreds of edible plants in Southern Africa.

He **lived** until he died. He lives on in faith and in our memories.

The spirit of research

Based on a talk given to TACRESOC — The Transkei and Ciskei Research Society. 19th April, 1982

by Dr F.W. Fox DSc

KEYWORDS: Research; Philosophy; Attitude; Curiosity.

TO BE invited to give the first Noristan Address to the society was an unexpected honour which I appreciate and for which I want to thank you. It is also a real pleasure to which I have looked forward, for it enables me to join in the tribute you have paid to the late Hans Snyckers and the Noristan Organisation which has made the existence of the society possible. Ever since its inception I have watched its progress knowing it was fulfilling a valuable and to some extent unique function: it was good to hear that you are taking the bold step of standing on your own feet and I wish you well in the future. Lastly, you have given me this chance to revisit the Transkei and Umtata, for it was here, many years ago, that I became converted from the conventional to a wider vision of what the study of nutrition is about.

Since this is a research society it seemed appropriate that in this first Noristan address we should think about the research concept itself, its origin and application to this area which is so rich in opportunities.

I can only draw on my own experience hoping to help you avoid some of the mistakes I have made. Let us start at the beginning.

Once we were all tiny babies. Our wants were few but clamant, so we lost no time in investigating our environment which rapidly started to expand. The tools available were a complex mixture of curiosity, observation, intuition, reflection, reason and imagination, but at first they were chiefly curiosity and observation. Both of these are highly developed in other animals. Take the ant for example: you find him in the most unlikely places and should you ask him what he is doing he says 'Oh, I'm just looking around.'

We certainly got off to a good start for it wasn't long before we deserved a degree in psychology for the way we twisted mother round our fingers; after taking the advanced course we learnt how to 'rule the roost' or pit parent against parent if

were exhausting both parents and friends by our inexhaustible energy as well as by the interminable questions we asked. Those 'six honest serving men' in the verses of Kipling: why?, when?, where?, who?, what? and how?. How we pounced if the story teller wasn't word-perfect; how we picked up long words and used them appropriately at the first attempt; with what ease did we learn the languages of the children we played with as well as the expressions our parents hoped we hadn't heard! Do you remember instructing your friends as to the make of an approaching motor car; how accurately we imitated all manner of sounds that we heard; or how hard we would slave to accomplish some ambitious task we imposed on ourselves. Yes, in those days we were capable, hard working, highly observant investigators who had caught **the true spirit of research.**

And then came school days. Fortunate was the child whose school encouraged, maintained or enlarged his enthusiasms; where he discovered the warmth of doing his best for his team, and the value of being sometimes allowed to daydream. How sad it is that for many children this formative time is one to be endured and got through as quickly as possible; when an avalanche of facts and the opinions of others must be absorbed; when the wonders of literature, art and science are just 'subjects' that must be 'passed' rather than enjoyed. Of course this is both an exaggeration and an oversimplification, for usually there are some teachers who fire the imagination of their pupils; nor is it a reflection on the teaching profession who often have to contend with great difficulties. But, whatever the reasons, it is a fact that many adults adopt a passive attitude to life having lost the thirst for knowledge, that eager desire to explore their environment which is so characteristic of childhood. They are more or less prepared to accept things as they are, to adopt the opinions of others, watch others engage in sport and to seek to be entertained rather than experience the joy of creative activity. The spirit of research can but languish in such an atmosphere.

But there is always a minority who are different; emerging unscathed with their quota of curiosity and their urge to observe and explore unimpaired, otherwise there would be no members of this society nor of other disciplines.
Deep-seated curiosity and the ability to be acutely observant are clearly noticeable in our Naturalists. This can be observed in such radio programmes as 'Talking of Nature'. I am often amazed, not only at the complexities of Nature which they describe, but by the extent to which they are endowed with these abilities and the enthusiasm with which they use them.

Look with wonder at that which lies before you

Most of us would admit, I expect, that any ability we possess in these directions must be cherished, for we all tend to take things for granted, imagine we 'know' when in fact we are but scratching the surface.

I well remember the occasion when this tendency was abruptly brought home to me while at college. At our first botany practical we were issued with a cabbage leaf. Although no botanist I did think I knew a cabbage leaf when I saw one. Having evidently noticed my look of disdain the Professor came to me and said 'Mr Fox, if you studied a cabbage leaf for the rest of your life you would never know all about it.'

My smugness was of the same type as that of the man in the USA Patent Office, about 1880, who recommended that it be closed down since there was nothing left to discover! How astounded he would be at the subsequent discoveries which have revolutionised our way of life and will continue to do so, for discoveries beget discoveries. Today, more than ever before, we must adopt the injunction attributed to Jesus 'to look with wonder at that which lies before you.'

What matters is our approach to whatever we are doing

This is not to suggest that we should all start investigating something: but what matters is our approach to whatever we are doing. Probably most members will say that their work fully occupies their time. However, history teaches that this close contact with life has been responsible for some impressive advances, far less likely to have been made by those who live in ivory towers. Sometimes the hobbies of very busy men, for instance, natural history or astronomy have been most fruitful. I am thinking particularly of those who feel imprisoned in a dull life of routine, because day after day they do the same work over and over again. Of course

there are those who prefer a routine job as we found out in our laboratory when one of our staff flatly refused our offer of a far more interesting job.

Close contact with life has been responsible for some impressive advances

A more alert mind may be able to turn the situation to good account. Here is an opposite example that occurred in our laboratory. One of our daily chores was to carry out a number of simple tests on a seemingly unending succession of urine samples sent in by the Miners' Phthisis Bureau, the General Hospital or by General Practitioners; most samples were usually normal but it was a slow tedious job, for the centrifugalised deposit, if any, had also to be examined microscopically. Possibly out of sheer boredom my colleague, H.D. Barnes, began to study the colours of the urines with the aid of a small hand spectroscope. Incidentally, this enabled him to reassure mothers whose children were eating gaudily coloured sweets. In this way he began to discover occasional unexpected cases of porphyrinuria. After much further work in which he isolated, purified and studied the pigments, as well as patiently tracing relatives of the original patients and sometimes their ancestors, his enterprise gained him a doctorate.

The more we ponder the meaning of what we are seeing, the more likely will be the occasional insight

Again, how many bacteriologists must have been familiar with the set-up that led to the discovery of penicillin. Its very familiarity dulled their eyes and their minds to what was taking place. The constant repetition of the same procedure becomes a habit requiring no thought. But the more curious we are, the more acute are our observations; the more we ponder the meaning of what we are seeing, the more likely will be the occasional insight. The attitude we strive to adopt is what matters. How right Pasteur was when he said that 'discoveries are made by the prepared mind'.

Discoveries are made by the prepared mind

But what about equipment? I think it is a misconception to believe that today an investigator must necessarily be armed with elaborate and expensive equipment. Of course this is true for some kinds of study although usually less so in the biological field. Moreover, if it is a question of undertaking a

worthwhile well-motivated project there are agencies which will make the necessary equipment available, as well as offer advice as to how best it should be conducted. These agencies may also be willing to carry out analyses or other tests on samples collected in the field. When compared with the facilities available even a relatively short while ago, those commonly in use today are immeasurably more helpful, increasing both the range and the quality of what can be done. But the opportunities open to the individual investigator, using the very minimum of equipment, as well as the value of the contributions he can make must never be minimised. Perhaps we should remind ourselves that the equipment used by Archimedes, Newton and Fleming was a bath, an apple and a few petri dishes, respectively.

Ideas are precious and should be treated accordingly — receive them hospitably and note them down

Ideas are precious and should be treated accordingly. They may arise from your work, something you read, or a friend's remark or 'out of the blue'. But when they knock at the door of your mind receive them hospitably, particularly if they sound absurd, impossible or unorthodox. Since they can vanish as unexpectedly as they came it may sometimes be well to note them down. Should they recur again and again your subconscious mind has become interested and you will get no rest until you have explored them, pull them this way and that, like a terrier with a rag. Should a new idea stand up to your criticism and seem to have merit, explore it on paper as fully as possible, but don't dull its freshness by reading about similar or relevant ideas. Perhaps that is what Bacon meant when he said 'reading rots the mind'. Your premises may be different, giving you a deeper insight to those who have turned it down. New concepts rarely come fully fledged. More often they develop from small beginnings. Your idea — your hypothesis — may require to be tested by means of lengthy experimentation and consideration of the relevant 'literature'. Don't be discouraged if what seemed to be a promising idea must be abandoned. It may be a 'hunch' that will take its time to develop.

Members living in African communities have opportunities denied to most of us. Not only can they fill out or add to the accounts given to us by anthropologists and others, but they can gain the confidence of older inhabitants and listen to the wisdom that no longer interests the present generation. Are we not forgetting that the peoples of the world managed surprisingly well to get on before the development of science and the use of the scientific method. Indeed, their outstanding achievements defy our attempts to imitate, far less to surpass them. But of greater importance were the skills they acquired to face the problems of day to day living. In southern Africa, because they are more obvious, we are impressed with the skill shown by Blacks in tracking wild animals; in their profound knowledge of plants useful for food or for medicine; in their handicrafts and their ability to deal with psychological disturbances and other problems. But they learnt much else about the more intangible issues of life which were often embodied in stories, sayings, remedies and the like. When we remember that everything had to be transmitted to the next generation by word of mouth, it is understandable that such information might be distorted in the process. Rather than dismiss them as nonsense or 'old wives' tales,' ought we not to study some of the more significant ones, trying to discover their underlying truth? Some examples taken at random: over 2 000 years ago there were Italian peasants who suspected that malaria and mosquitoes were in some way associated; later there were people who believed that jam moulds if applied to wounds hastened the healing process; and English dairymaids who believed that if they contracted cowpox they would not catch smallpox.

If you decide to publish an account of your research, remember its reception will be unpredictable. Owing to the volume of articles appearing in the scientific journals it may be overlooked even by those most interested in your field; or it may lead to stimulating correspondence with new friends. The same unpredictability may attend the publication of outstanding discoveries. Here are two extreme examples: Jenner's discovery that something taken from a sick animal would protect a child from smallpox must have seemed a strange — indeed a repugnant – concept; yet it was acclaimed at once and adopted both in Britain and in other countries. However, a simple sensible way of preventing the dreaded puerperal fever, discovered by Semmelweis, met with bitter and violent opposition which eventually drove him into an asylum for lunatics; however, he never lost faith that the truth would ultimately prevail. More recently we have the bitter cynical remark attributed to Max Planck that 'scientists never change their minds but eventually they die.'

The joy of research must be found in the doing, since every other harvest is uncertain

Remember also that there is one reward which will never fail those motivated by the true spirit of research, namely, the satisfaction and pleasure that comes when one has done one's best. 'The joy of research must be found in the doing, since every other harvest is uncertain.' How well Kipling understood this when he imagined the future life of a painter working with 'brushes of comet's hair'.

> 'And only the Master shall praise us, and only the Master shall blame;
> And no one shall work for money, and no one shall work for fame,
> But each for the joy of the working, and each in his separate star;
> Shall draw the Thing as he sees it for the God of Things as they are!"

Relevant Reading

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