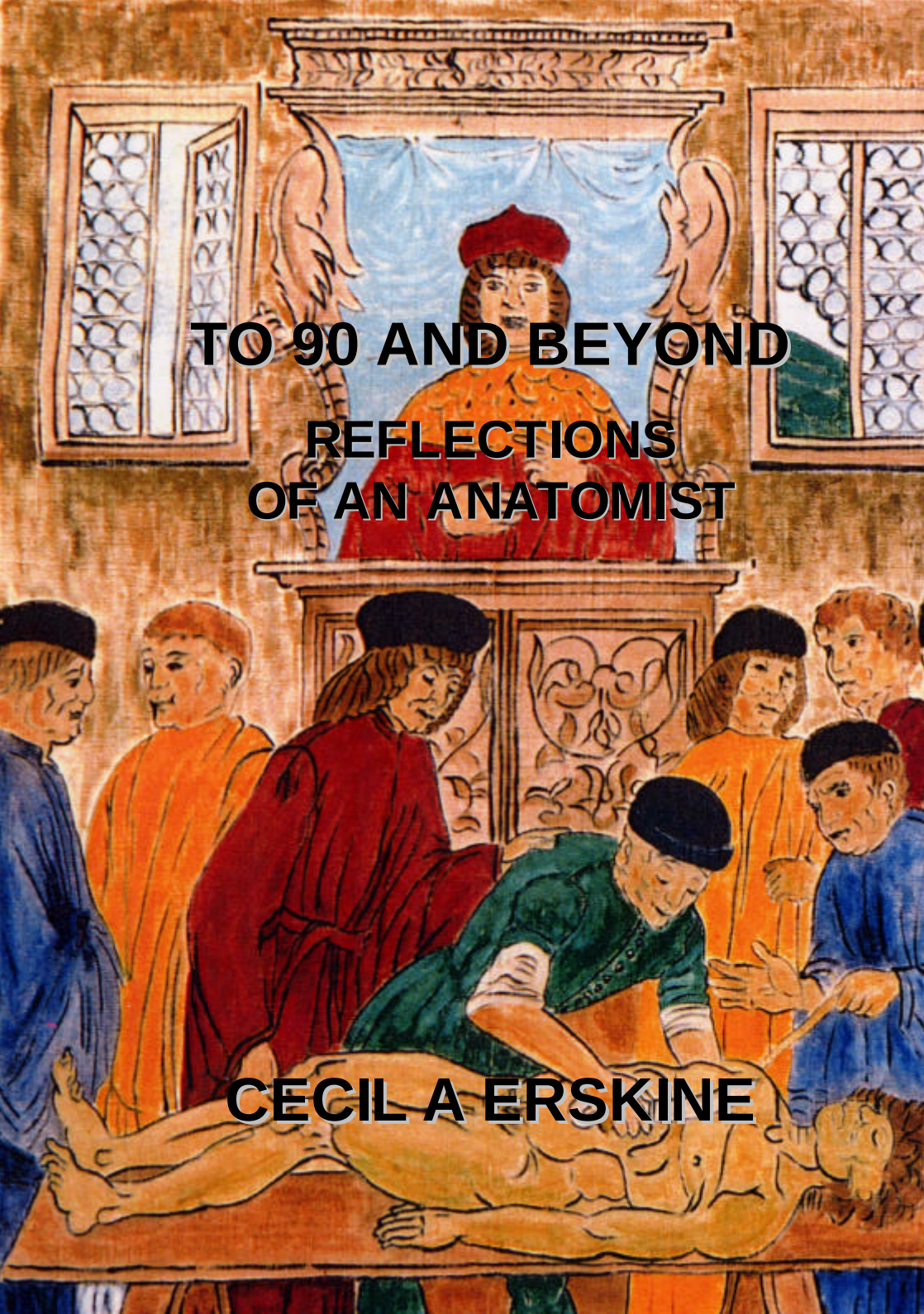

TO 90 AND BEYOND

REFLECTIONS OF AN ANATOMIST

CECIL A ERSKINE

About the author

Cecil Erskine has an unusually wide experience in a variety of specialist hospital residencies, much of it before WW II, as well as attendance at the Baudelocque Maternity Hospital in Paris and the University medical clinic in Lausanne before taking up an academic career in anatomy. This began as staff member at the Royal College of Surgeons in Dublin, then at King's College, University of Durham Medical School, later at St. Mary's Hospital Medical School, London University. He was appointed Professor of Anatomy and also to the antique chair of Professor of Anatomy and Chirurgery (later pulled from under him – one chair was thought enough) at Trinity College, University of Dublin in 1947. He retired in 1984 at 71 years. Previous publications are all scientific in leading academic journals in England, Germany, United States and Scandinavia.

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TO 90 AND BEYOND –

INTRODUCTION

As we get older we want to avoid extinction too soon, something that happens all too often. The statistics are not encouraging. Over one third will die of cancer, heart disease and stroke make up more than another third and of the rest accident makes a significant contribution to the dismal list. Genetics is only a minor contributor. Most of this premature mortality is preventable.

There are plenty of recipes for prevention. When centenarians and near centenarians are asked for a recipe for a healthy long life the response is something like a glass of whiskey a day or a cigar. All I can say as a 90 year old is don't bank on it.

We are constantly bombarded by the media on the benefits of diet and exercise. Healthy longevity depends on more than diet and exercise. There is increasing evidence that exercise of the brain is just as important as physical exercise. The brain is already beginning to fail in nearly everybody at around thirty, well before middle age. Characteristically, this always escapes notice and is something rarely mentioned. The method to counter this subtle rusting and its destructive effects on longevity is to

take up the study of what is acknowledged by experts to be the world's most difficult written language – classical Chinese. The question is why then are vegetarian Sinologists not all centenarians? Simply because study began so early in life, when the brain is at its best for intellectual tasks that stretch mental capacity to the limit. Thereafter Sinologists like everybody else just coast along.

So here follows information and advice variously packaged and dispensed drop by reviving drop on the way to 90 years and beyond.

CHAPTER 1

AROUND THE WORLD AT SPEED

Fresh from medical school but as usual in no hurry to get busy, friends of the family with shipping connections suggested, even insisted, I become a ship's surgeon for a few months and travel the world. Everything would be fixed, duties would be minimal, which indeed would be desirable since I had absolutely no experience; in those days prior post-graduate hospital appointments were not a requirement for independent practice. The refrigerator ship was brand new. Lucky for me, I wasn't on board when it disappeared in the Pacific.

On entering port I could go off exploring while any medical attention required by the crew would be taken care of by the company's port doctor. To make up for deficiencies in experience I thought it wise to bring a suitcase full of textbooks. This when put down seemed nailed to the floor. It was never opened. Once an attempt was made to diagnose by Morse code (recently defunct, I see) when I tried to interpret results of tests by question and answer transmitted to a ship 100 miles away. The ship's first officer was the patient. Before I could make a diagnosis by this cumbersome method, and far short of treatment, the signals faded away, like the patient I imagine.

Crossing the Atlantic in unremitting storm force

November gales in a relatively small ship with mountainous waves 20 metres and more high, I can well understand how a ship can disappear. It simply capsizes, which has happened more than once. I was completely indifferent to this possibility. A preoccupation with keeping attached to the ship was the aim while routinely traversing the deck to the stern where the so-called hospital was sited. Being at one extremity when pitching, the vessel's motion was magnified giving the sensation of being in a jet-propelled express lift. Anything taken out of a drawer, if put down, would rise and fly. Patients risking a visit were dealt with in slow motion while I tried to stay upright.

Another irritation in sea travel in bad weather in a smallish ship is the phenomenon that occurs when half the ship is raised out of the water by the swell and the next huge wave is met. This hits the bottom with a thunderous crash and sends a judder from one end of the ship to the other. This annoyance hardly ever stops in rough weather.

First port was New York. My first impression was that the citizens in the streets looked *foreign*. I felt more at home in Paris or Zurich. If this seems incomprehensible, recall that European populations in the 30s were far more homogenous than cosmopolitan New York. Visits to various places of interest besides museums and the Statute of Liberty included the roof of the Empire State Building – then a venue for serious suicide jumpers. They went down at 140 mph. Also on the list were automat restaurants (a kind of self service

only recently disappeared), the Roxy Theatre and the Presbyterian Hospital, New York's largest, possibly the largest in the country. A visit here seemed indicated since we were in the same business – healing the sick, occasionally. A physician delegated to show me the facilities I regret to say was very unfriendly, for reasons unknown. But for a long time New Yorkers have had a reputation for rudeness and as someone has said a car is useless in New York, essential everywhere else – the same with good manners. This introductory encounter with America I am glad to say was more than offset later by an American of a very different kind. This was the leading U.S. neurosurgeon Horrax, one time assistant to the doyen of American neurosurgery, Harvey Cushing. As one often finds with those at the very top of their profession his friendliness, charm and modesty were something to be experienced. After Philadelphia, of which like many Americans, I remember nothing, our next stop was Newport News. This cannot have been the Newport I had heard of as a playground of the rich. It seemed to be a large shunting yard with sparse inhabitants, none of whom looked rich.

Then to the Panama Canal through which we moved very slowly and cautiously. I read somewhere that twice as much material had been dug out to make it as had been used to construct the Great Wall of China. Nobody could doubt that the Great Wall of China as a spectacular feat of construction is an easy winner. Who ever heard of a conducted tour of the Panama Canal? That is up to now when the US hands over the Canal to the Panamanians. They say the border rain forest will be opened up to

tourists. Look forward to a bit of chain sawing.

Unlike the Atlantic the Pacific was calm all the way. Occasionally flying fish were seen, and dolphins surfaced racing a few yards from the bows. Nothing else happened.

If this description of sea travel seems extraordinarily dull – well, it was. The ship was a trading vessel with a few passengers, the main reason for my presence on board. It was the antithesis of the modern cruise liner where every kind of entertainment is provided in abundance. Here passengers all look inwards – looking outwards there is nothing to see but sky and an expanse of water.

In the middle of the Pacific we stopped at Pitcairn Island to bring supplies. This visit produced a potential patient. Patients are everywhere. Without docking facilities to meet us the inhabitants came out in boats. Among them was a tall friendly inhabitant introduced as Fletcher Christian, a descendent of the leader of the original mutineers. He had a hand problem, Dupuytren's Contracture, which I examined. This condition requires surgery, usually with good results – but sometimes not, even in the hands of experienced surgeons. Without experience in any kind of surgery I decided it was inadvisable to practise on Fletcher. He was left untouched for which he should have been grateful.

Then to Sydney, Melbourne and Adelaide – all smart modern cities, though very different from each other in

appearance and atmosphere, from Sydney's modern American style with impressive ten storey skyscrapers – no opera house then but the bridge was in place – to Melbourne and Adelaide's Victorian English provincial. New Zealand was next with stops at the four main towns, much smaller than those of Australia, and subject to frequent earth tremors. I don't know if this had anything to do with the fact that the pavements were made of planks of wood. The earthquakes don't seem to be mentioned nowadays and I expect the boardwalks too are no longer there.

Unfortunately at these ports delay and obstruction ruled. Being apolitical I cannot recall if the ruling classes of the time were of the extreme right or the extreme left, but their extremities were held responsible by the Captain for the problems of the ship's operations, or lack of them.

Finally tearing ourselves away we crossed the Southern Ocean to Cape Town, a nice setting but not much to do, then up the west side of Africa, with a brief stop in French West Africa, at Dakar. What struck me here was that apart from the dazzling dress of the inhabitants, I was on the equator at a temperature around 130°F for which the solar hat was simply useless. I felt like the egg on asphalt – fried.

Some days before this a break took place in the monotony of the daily round of the twenty minute ship inspection with the Captain and Chief Steward (mainly looking for dust it seemed), and the ten minute attendance at the hospital clinic with perhaps two patients

on a busy day. Usually nobody turned up. It may be that it was thought risky.

Then the first harbinger of my sensational foray into the unknown territory of dental surgery appeared. This was one of the crew accompanied by an interpreter. The patient complained of severe toothache in a perfectly normal left second lower molar, as I distinctly recall. He wanted the tooth extracted. On examination I told him extraction was unnecessary and gave him an aspirin. He came back repeatedly still complaining, as patients do. I refused his requests for action.

Pressure was now applied by the Chief Engineer who was in charge of the crew of the engine room and was fed up with these complaints. He asked me to proceed with the extraction to satisfy the patient once and for all. So with the Chief Engineer and the interpreter watching closely a few feet away I selected forceps which looked the most appropriate from a case of quite unfamiliar dental instruments. There was a dental syringe for a local anaesthetic but I decided against using it, as it might increase the risk of infection (antibiotics hadn't been invented). I told the Chief an anaesthetic was unnecessary; I would have the tooth out before the patient knew what was happening. Gripping the tooth firmly, in a split second it was out. My observers were filled with admiration at the skill and speed of execution. Lacking modesty I didn't say that either of them could have done equally well since their experience and mine was identical in this therapeutic area. Of course nothing is perfect. The patient still complained. I still could not

find a cause. He left the ship at Dakar a few days later and was consigned to the care of a surgeon from the French Hospital.

Then on to Antwerp and finally to London where I learned a very simple, very reliable test for beriberi from no less a person than the Chief Medical Officer of the Port of London. I never had occasion to use it afterwards since this deficiency disease was rare in Europe (it still is). At no cost and without requiring expensive machinery, such a test would not be favoured today. Simply ask the suspect to knees bend; a beriberi patient cannot complete the action because of characteristic nerve damage.

Where in this story is advice on long life? Stay off ships liable to sink, obviously.

CHAPTER 2

THE NATION'S NUMBER ONE KILLER

Many years ago as a joke I put it to a practising physician that if the entire medical service were closed down it would have practically no effect on the death rate. My idea was that the numbers that would die as a result of medical care gone wrong would be balanced by those who would survive without it. I was mistaken. When tested, the result was a decided imbalance as was shown when doctors went on strike. Not as everybody would assume, a rise in death rate, but *a fall.* This early test took place in the Fifties and has been repeated several times since in Europe and Canada. Each time the falls in mortality and morbidity were substantial. How to explain this well documented phenomenon? Obviously there are medical and especially surgical emergencies where intervention and specific treatment is life saving. However these are relatively few in relation to the total volume of hospital admissions. Adverse drug reactions fuelled by the enormous quantity of drugs given, often inappropriately, and by mistakes and mismanagement which arise from the complexity and defensive nature of the system as well as the hospital environment itself, all contribute to the sizeable mortality.

Books appear from time to time, which criticise important aspects of modern medicine. Much of what the authors of these books say is valid, supported by

evidence and comes from respected practising physicians. Even the editor of *The Lancet* joined in recently. Why do they seem to have no effect? Even after years of pointing out deficiencies in medical services which are far from minor, but which result in a significant death toll, nothing changes.

Before we go further I must say that the tone of my remarks made about medicine today may be misunderstood. From my experience of colleagues in practice, medical students, postgraduates and auxiliary personnel, practically all impress as dedicated and often idealistic. They struggle to do the right thing. However, the more complex a system becomes, with the increase in personnel at all levels, inefficiency and mistakes with danger to patients, grow exponentially. Powerful pressures from corporate institutions that feed the system contribute to the dangers and cost.

Any history of medicine points out that in Victorian times it was far more dangerous to come under the care of the physician than to avoid his ministrations. Accounts of therapy of that time make this easy to understand. Though therapy may have changed the dangers have not. Good results in both medical and surgical therapy are achieved mainly in younger patients. The older with mainly self-inflicted and chronic degenerative disease resist effective treatment. Other factors come into play. History is always enlightening. McKeown points out the changes in incidence and decreasing mortality of infectious disease over the past three centuries. Though contrary to the opinion of nearly every sociologist,

mortality from infectious disease is independent of medical intervention and social development. In fact this is what one would expect from knowledge of the evolution of disease. The decline in pneumonia mortality took place before the introduction of chemical antibacterial drugs and the actual *arrest* in decline coincided with the introduction of antibiotics. Of the several thousand diseases that at present afflict mankind, in only about three hundred is the aetiology known. Thus it is no surprise that treatment sometimes falls short of expectation. This is not for want of drugs. Fifty thousand are available. I would say perhaps two dozen are specific and effective. On the other hand surgery, especially for trauma, is well-developed thanks to the plentiful supply of material from the mayhem on the roads. Fracture treatment was revolutionised by the Viennese surgeon H Böhler by his experiences in World War 1. This was a real advance, which has been developed and used by all fracture clinics worldwide.

Everybody is aware of the misuse of antibiotics, practically from the moment of their introduction. Viral disease comes up every few months as the example where antibiotics are not only ineffective, but also positively harmful. An example from the past on the misuse of drugs is Edward Kennedy's Sub-committee on Health Care in 1974 where it was learned that 50% of hospital patients received contra-indicated antibiotics that gave serious reactions. The cost? More than one billion dollars and at least 30,000 deaths. Has the position changed?

Recent reports say not in the least. By coincidence the figure of 30,000 premature deaths by treatment is matched by another 30,000 through the introduction of an intravenous infusion package that had an unrecognised dangerous component. It took years to uncover its lethal effect. The total number of patients damaged or killed annually as a result of hospitalisation is of course more than 30,000. It is estimated at something like 400,000 a year.

The baleful effects of treatment, no matter what the circumstances, and seemingly applied without discrimination is seen in Coleman's description of what happened to Mr Wills, father of a ward sister, when he had the misfortune to arrive in a coronary care unit. Coleman was a medical student in the late l960s and the horrific sequence of events he describes made a powerful impression. At the end of the century nothing has changed. Coronary care units that are enormously expensive to run could be drastically reduced in number. But there is a difficulty. To do so would be to apply *triage*, or only treat the percentage of patients who are most likely to benefit. This is around 5% but the likely beneficiaries are not easy to pick out.

The discovery of the bacterial cause of gastric ulcer by an Australian physician, Dr Barry Marshall, nearly 20 years ago and its simple cheap and effective treatment was not well received on its introduction. It was actively resisted except in a few centres. As with blood pressure drugs treatment of ulcer is for life and long-term drug treatment made unnecessary was very unwelcome to the

drug industry. Unfortunately as could easily have been predicted the bacteria respond to treatment in the usual way by the development of resistance, helped by the nature of the environment in the stomach. Nevertheless the importance of the discovery is that the cause of the disease is revealed. There is a continuous stream of research papers on the problem of resistance in this disease, which should, before long, be solved. The heroic researcher who discovered the cause (he infected himself) should receive an award not only for his discovery but also for his bravery.

A Russian treatment for asthma, discovered by Professor Buteyko, involving exercises in the control of breathing, which costs nothing, also received a hostile reception. But the drug industry showed its confidence in the conservative medical profession by opening a new plant for inhaler production (which would take a dive if the exercises became widespread).

Before they began the clinical course I suggested to my students that they should read a newly published critical book on prescription drugs. It could be said that advice on clinical medicine was none of my business. But what are students for if not to be informed? The publishers told me this book nearly didn't get published because of a stream of threats of legal action and the publishers can be admired for performing a public service. A similar but far more comprehensive work is Australian lawyer Braithwaite's on the structure and operation of the trillion dollar pharmaceutical industry. This kind of information made me advise the class to

look after their health and to stay out of hospitals, which are dangerous places.

For years I quoted the statistic that 10% of patients who enter hospital received something nasty, occasionally lethal, they did not go in with. This statistic was later revised upwards to 15%. The latest news is that it has reached an almost unbelievable 34%.

A former student who had been acting as locum in a general practice reported to me an interesting example from those who know intimately what goes on in these institutions. It concerns a carer on the receiving end. The doctor was called to a female patient in severe abdominal pain. Her problem was easily diagnosed as a kidney stone stuck in the tube leading to the urinary bladder. If it doesn't move on, kidney damage results. Told that she must go to hospital immediately she absolutely refused. On being pressed for the reason, in desperation at her doctor's obtuseness, she responded with *"But doctor, I'm a nurse!"* Finally overcoming her resistance she was admitted and her problem solved. A success for surgery.

Every year in the summer vacation former students usually now trainee specialists, or sometimes senior students who had been on exchange programmes, visited the department to talk about their experiences. I valued these conversations, which often revealed something of current medicine from the inside. On such a visit one of my typically talented Chinese woman graduates told her story. This emerged in the course of conversation when she remarked that she had decided to leave the U.S. after

spending two years of a four year course there as an anaesthetist in training. She would transfer to London. After some relaxed conversation her reason for leaving emerged. She recounted in particular an occasion where she was responsible for anaesthesia for a very ill obese woman patient. This is risky. The main aim of the surgeon is to carry out the essential life saving minimum and get the patient back to the ward as soon as possible. But in this case, having completed the main objective the surgeon continued to undertake additional procedures which the anaesthetist could see were not relevant, or in any way necessary. He kept calling over his shoulder each item of procedure to a member of staff responsible for keeping notes of what was being done. Each of these items would go down on the comprehensive bill. Our alarmed anaesthetist several times told the surgeon it would be best to get the patient off the table as soon as possible, reporting that she was becoming moribund. Such a situation is dangerous for the anaesthetist since death on the operating table is subject to enquiry. The anaesthetist would be quite likely to get the blame. Finally the patient was returned to the ward, and died shortly afterwards.

Our anaesthetist also reported a variety of disturbing incidents including some from the obstetric unit. Extreme examples of malpractice are rare. They do not all take place in the U.S. In England a gynaecologist lacking skill but not persistence over years inflicted life-threatening damage on hundreds of women before being struck off the medical register. At the moment the General Medical Council is being pressed to take a harder line with

incompetent and criminal doctors. We can only wait to see if it does.

Now an example of modern medical practice where everything is carried out to the highest professional and ethical standards, but which, nevertheless, makes an observer uneasy. This is seen in the treatment delivered in a leading high tech clinic. The patient was brought in as a result of a sudden dramatic whole body paralysis with inability to speak. Promptly she received tests of increasing sophistication in the endeavour to make a diagnosis. After intensive but fruitless investigations the neurosurgeon was called in: so to surgery where access to the brain was achieved by boring a hole in her skull. A piece of brain was removed and subjected to scrutiny. Still no diagnosis. A week later, when keeping the patient under baffled observation she suddenly and unexpectedly recovered from her paralysis, and speech was restored. She was discharged almost intact, classified cured.

Specialist text books, in the byways of mental derangement supply examples of strange disturbances, some of which I am sure not one in a thousand doctors ever heard of. Television mines this area and occasionally turns up examples for their documentaries. Nearly everybody is interested in disease (at a distance) and the more gory the treatment the better.

But whatever the problem the absolute necessity to do something, no matter what, is characteristic of U.S. practice. Laudable in intent this principle has spread worldwide. The American surgeon Nuland relates how a

92-year-old woman with a perforation of stomach, certain to die with or without an operation, at first resolutely refused treatment. But she was pressed to undergo the dangerous repair. As expected, she died shortly afterwards. The point of this history was that had Nuland acceded to her request, which he wanted to do, to be left alone, it would have led to his being charged with negligence with the most serious consequences for him. Nuland remarks that in such cases ethicists and moralists from their distant viewpoint run aground trying to judge the surgeon's actions.

On questions of ethics in medicine, books are rather scarce. We can be critical of some well-known ethical watchdogs from the point of view of honesty and common sense, a loser in these matters. A cynical bid for increase in political popularity by taking sides may easily be a factor. Opinions that are more matters of taste rather than reasoned opinion based on evidence become the law of the land.

The paediatrician Lantos is concerned with ethical questions. Incidentally, in describing his own medical education Lantos reveals that in his student anatomy lectures he sat at the back and read a newspaper. I would say this is criticism of delivery and not subject. Properly presented anatomy is far more interesting than brain surgery.

Lantos provides detailed case histories that allow the reader to decide what he or she thinks the best action to take. The sad facts of modern medical organisation and

all its practical, moral and ethical aspects are revealed in these real life situations. Many of the dilemmas Lantos presents can be interpreted in different ways. Just one description of many is a frightful disaster in the use of growth hormone, which encapsulates the approach of modern practice in all its aspects. I suppose that even five years in different departments of medical practice is insufficient to entitle me to comment on Lantos's observations, especially since my experiences are from a different age. Ethical problems he discusses I had never heard of.

Demand for medical service by the population in every country in the world is without limit. In the US. health care costs compete with the defence budget, yet one review in the 80s shows that the health of the population steadily declined over the previous 30 years. Rene DuBos of the Rockefeller Institute said that medicine would never conquer disease. Health is a mirage. Thirty years ago he predicted the present resurgence and frightening spread of a deadly form of resistant pulmonary tuberculosis, which seems to have taken everybody by surprise. Before DuBos, Ricker in 1951 cast doubt on the very ideas of health and disease. They are not truly scientific concepts. They belong to the applied sciences, healing to hygiene and disease to the healing process.

Ill health today is largely self-inflicted in practically every category, except those diseases genetically determined and these are a small minority. Troubles with health are compounded when not actually caused by

indiscriminate administration of prescription and other drugs. The marketing power of the drug industry is so great that nearly 100% of the population has been persuaded to swallow pills of all colours, size and shape every single day.

An idea of the kind of profits these companies look for is seen where they buy in bulk, turn the product directly into pills, package in bottles of 60 which contain 11.7 cents worth and sell for $8.40, a profit of 7079%. This and much other interesting information is revealed in Braithwaite's book. As Braithwaite is a lawyer he was probably difficult to shut up.

Superficially one would think surgical practice is less prone to the liberal distribution of medication. But transplant surgery is a good example of medication forced on patients by necessity. Organ transplant programmes have been running for more than 30 years. From time to time in the media we hear of successes and patients are paraded to prove it. But the facts speak otherwise. Although some patients may live for years, poor results are essentially the rule because of immune rejection that is not very easily controlled, even by the large amounts of dangerous drugs prescribed. To try to avoid immune reactions artificial hearts of different kinds have been tried from time to time. Results are equally disappointing; implanted foreign bodies are not well tolerated. I find it hard to believe that the latest £100,000 model will be any better in the long run.

Cancer has been subjected to a hundred years of

research at ever increasing cost with meagre practical results to show for it. In the past young researchers who were interested in this field were advised against taking up cancer research. Grants were usually refused. Success was judged unlikely.

But a solution for this problem is now in sight and before too long, I am sure this will come about by the substitution of crude chemical for precise and delicate biological methods. The progress in the next decade or so should produce effective therapy for at least some deadly types of this disease. Molecular biology research proceeds apace. Unfortunately, the drug industry only sees the opportunity in genetic mapping to market new drugs since genetic manipulation seems outside their control.

But in case there are hitches in the progress to the medical utopia we are promised, those who would like to live to 90 and longer, healthy and active on all fronts, the first step as I have shown is – plan to stay out of hospitals and stop swallowing pills.

CHAPTER 3

ESCALATING DANGERS OF THERAPEUTIC COMPLEXITY

Never in a series of hospital appointments did I experience the stress, or the hundred hours plus working week that we hear so much about today. Probably the relative trickle of patients in those days compared to the uncontrollable torrent today accounts for this. Another major change from practice sixty years ago that I recently saw described as "primitive" was the early direct contact made by the doctor with the patient in hospital and which was maintained in his or her perilous journey through the system. Today it takes an average of twenty-two staff to handle a patient and, most important, sign the mandatory bits of paper at each step from admission to discharge. This fragment of information was discovered independently by two of my former students

An example of real simplicity is anaesthesia. I had no difficulty in maintaining control of depth with a bottle of anaesthetic mixed in proper proportion and with equipment consisting of a wire mask covered in lint through which the patient breathed and onto which the mixture was dripped. Total cost of everything about £5. Today's consultant anaesthetist recoils in horror at such a primitive Victorian practice. Now the elaborate gear costs 50,000 times as much, at least. The advantage in present day methods are well controlled and monitored anaesthesia over long periods; this allows the

performance of spectacular operations which provide a well-defined genre of entertainment for TV.

I shudder at the thought of getting a blood transfusion, rare fifty years ago, today a major industry. Mixed blood comes from a score of donors. In the US denizens of skid row are paid for blood. In any case I would say 75% of transfusions are not necessary.

Some fundamental changes in medical practice today are the result of imports from the U.S. One such import relates not to dangers in treatment but dangers to the budget. The upsurge in litigation has added both complexity and billions to the cost of health care. The cost is not so much the awards of damages for negligence but the wasteful elaborate defensive measures built into the system to meet any possible challenge. Litigation in medicine was practically unheard of before 1950.

The litigious nature of modern society, which is independent of age, sex or class, is shown by a press report recently about a ten year old boy out walking with his mother. Just for fun he picked up a brick and hurled it at a plate glass window. Unfortunately the window was unbreakable and resisted the attack. The missile was returned to the sender where it bounced off his head, knocking him unconscious, temporarily. Naturally the mother sued, on grounds bizarre and convoluted. Amazingly, she lost.

Or take the case of a request for a legal opinion which is truly a model illustration of today's conditioning

and thirst of the population for litigation at the slightest opportunity: “Soon after I received my Acme pencil, it rolled off the desk and on to the floor. Upon retrieving it I hit my head on the desk. Can I hold Acme responsible?” The letter was signed “Boiling Mad”. I read this in the incomparable New Yorker, so apply the usual pinch of salt.

A less well-known consequence of this litigious climate today is the reluctance of the doctor in a public place to go to the aid of a person in need of medical assistance; not to do so is illegal in France. A first-aider can rush in without danger (not worth suing), but doctors have had substantial and wholly unmerited damages awarded against them for their humanitarian efforts.

As an anatomist I can say that I am very dissatisfied with the design and structure of the human body. The design is poor in a variety of ways. Structural defects lead directly to malfunction. Two thirds of the population at some time have complaints based on these structural defects. Articulation between vertebrae and the number of muscles controlling the limited movement are many and complex. Knowledge of the details is not of any help in attempting therapy. Medical students and even orthopaedic surgeons only know the general disposition and can get mixed up in the complex names and relations.

The most exhaustive study in the world of low back pain of all grades and origins went on for 10 years in the US and led to the conclusion that first, nobody knows

anything about the back, and second, for treatment – do nothing. Nearly all cases will get better by themselves. The significance of this study unlike many concerned with therapy involving drugs was that money was not involved in the relationship. Independent funding was provided. It cost millions. I think many believe low back pain has a psychological element, which is an added complication.

Another area with weak design and structure is the foot. Only 20 years ago the cause was discovered of a debilitating complaint suffered by some hospital nurses. This was pain in the front part of the foot on walking which nurses naturally do a lot of. It was put down to a mild occupational arthritis. The cause was a very fine, hard to detect, facture of the bone leading to the big toe.

Taking a taxi I often ask the driver if he has a back problem. Usually he says yes. If he says no I then tell him I have bad news. Taxi drivers are especially prone to back complaints. Designers don't seem able to design an orthopaedic type seat to prevent this. I have asked the question so often that when I asked one driver if we had met before he replied "no, but your reputation has preceded you". As a Cassandra I suppose.

In reviews of the state of hospital services defensive medicine is rarely mentioned yet it absorbs probably one third of the cost and time of these services. Suppose a patient comes in with a history of a fall on the pavement. This is common and the main danger here is a fracture of one of the small bones of the wrist when the arm is

stretched forward as a reflex to protect the face. The small bone is near the base of the thumb. This is a typical indication for a radiograph though it can easily be diagnosed by history and examination. Usually several pictures are taken to show healing which often does not happen. The state of healing, however, can also be determined by physical examination.

Less clear-cut is dealing with vague abdominal pain. This leads to repeated radiography though the physician knows it is very unlikely to show anything. Any complaint related to the back is certain to lead to repeated radiography or scanning. Anybody over forty will show well defined degenerative changes in the spinal column and the older the more marked these become. Looking at the spinal column of an eighty-year-old it is a wonder they can walk; yet many play a good game of tennis. Similar symptomless arthritis is found in some 14-year-old children in the joint at the tip of the shoulder. Age changes in the skeleton start early and can be found in any twenty-year-old.

Fail to take radiographs even when there is no indication to do so or fail to test for this or that relevant or irrelevant and a lawsuit is all too likely. For a long time in the US firms of lawyers have specialised in this field classified as medical negligence. They can secure substantial sums for their clients and millions for themselves. It is a kind of ancillary industry to health care. The practice has spread to Europe over the past decade.

CHAPTER 4

ADVERTISING YOURSELF IN THE WORLD OF SCIENCE

All advances in medicine are the outcome of constant research. This has expanded enormously in every field. In principle, though not always in practice, "pure" as opposed to the applied research of technical institutes is carried out by the University. This has changed as university science departments enter commerce. The result is that many science departments have expanded so much they have changed into commercial enterprises, looking for practical applications and patents. Formerly most university research added to the store of knowledge. This was not always looked on with favour.

In the late 19th century in the U.S. even well known institutions funded by outside agencies research was sometimes considered a waste of time and money. This is total incomprehension of the meaning of scientific research. Understanding science and medical research is not improved by the increase in volume and complexity of advance. Bruno Bettleheim stresses the value of fairy tales for psychological development. He suggests however that when their influence persists into adult life the result is psychological damage. Richard Dawkins has always been an advocate of education to get rid of harmful ideas and resistance to science. Everyone must agree with this laudable proposal. Dawkins does a fine

job but I'm afraid it will be all uphill work. As we shall see irrational beliefs are embedded in the individual psychology and are resistant to education.

Research is useless without dissemination of information. The methods vary but a major part up to the present is played by the medical and science journals. The information is highly specialised and is usually extremely technical. This leads to fragmentation and today there are thousands of science groups who cannot communicate with each other.

Medical and science journals vary in quality and in the respect they can command. What medical and other specialists think of journals is seen by a study many years ago by the Science Museum Library on their frequency of borrowing. Over a year more than 50% were never asked for, and 25% only once. Of 9,000 journals only sixty were used with any frequency. Today the number of science journals has soared to around 200,000. A good many of these in the medical field are purely commercial productions, which masquerade as science journals.

Up to the 70s at least more than nine out of ten papers submitted to the acknowledged top journals were rejected. Today the proportion is probably higher because of increasing volume of submissions. But many editors are much less critical; the implications of this for the quality of much science research publication are obvious. It means that the vast bulk of so called research papers sinks without trace simply because much of it is produced from the old "publish or perish" rule whereby

without continuous publication there is no advancement in career. To get accepted by the most respected journals needs something original. This need not be something useful, just a new observation. The laser was discovered more than thirty years ago. It was not thought to have any practical application. Today the laser is essential for all kinds of appliances. Without it whole industries would not exist.

Acceptance by top journals was always regarded as equivalent to validation of originality and worth. Up to fifty years ago papers were usually by individual authors, the norm for a literary work, or by two, rarely three joint authors.

Today things are far less simple. Nowadays a science paper, whatever its merits, submitted by an individual would probably be rejected. The reason is that good scientific work today is too much for one small brain. Teamwork is required. But teamwork has been propelled to absurd lengths. The result is that a paper carries a whole list of authors. I recently examined authorship in publications in the medical and biological sciences, and found an author with 50 collaborators, then one with 67 turned up, only to be topped by one with 96! But when it comes to assessing candidates for appointments, advancement or grants, the question is – who did what?

Surprisingly, this esoteric problem of multiple authorship in medical and other science papers received attention in the popular press recently with reports on the attempts to solve it. One suggestion, which I predict will

not work, was to ask the authors to grade themselves in order of the proportion of their contribution. This would be like asking film actors to arrange their billing in proportion to their creative contribution. A non-starter I think.

Something curious appears in these lists of names. A few do not seem to be of European or Eastern origin. Though unusual, Blutfogel, von Baldass or Wurmbrand are obviously of German origin, but difficult to place are Formica, Psychyrembel or Womble. Ash and Lake give many examples of such unusual names and should be consulted on this interesting subject.

For years I thought Sudhof, the medical historian, must hold the record for lifetime individual publication with nine hundred papers. Not much of this massive historical information reached the general public and I would say few had ever heard of him. Then one science researcher was believed to hold the record with two thousand articles. But then the record passed to a scientist with a stupendous three thousand five hundred. It seems this scientist started early at 18 years old and finished late in his 80's scribbling away for dear life on what was supposed to be research.

Putting this in perspective Barbara Cartland by the time of her death at 98, and latterly writing about a book a fortnight, had managed only 723 published books.

Preparation for science publication requires, among other important things review of existing information on

the subject, experimental design, and testing for validity, all of which takes time.

Surprising examples of additions to publishing volumes are two recent newspaper reports that appeared about important discoveries in anatomy. One researcher said that Gray's Anatomy had nothing to say on what he had discovered. Gray's Anatomy is an elementary text for students and no anatomist would dream of quoting it as a reference. The structure of the human body is far more complex than even many in the medical profession imagine and is described at several different levels of detail. Descriptions in elementary books and articles for popular consumption are so superficial they can be misleading because of what is left out. Descriptive anatomy has long been a worked out field of research since just about everything has been described and reported somewhere. A fearsome volume of descriptive information has been built up. One multi–volume textbook published decades ago has 60 pages on the umbilicus (belly button). I don't think anyone today need bother to research this bit of anatomy.

The question we are interested in is how much of the vast biological science effort today in research is directed at ageing. I am glad to report quite a lot. The research is the fundamental link of ageing with all living processes and thousands of researchers are working on one or other aspects of these processes. I think it quite possible before this century ends for normal healthy people specific means will be discovered which will double present average longevity.

CHAPTER 5

LIFE SAVING VALUE OF CASE HISTORIES

There is more than one way of looking at case histories in medicine. Their primary use is for diagnosis. Differentiation of a disease entity is another. This was the function of the classic of Emil Kraepelin on the manic depressive psychoses. Though his book dates from the twenties every serious textbook on psychiatry and abnormal psychology cites him today. Anyone can read this book and acquire as much knowledge on these afflictions as any psychiatrist. Novelist Canetti quotes some of the extraordinary histories where he interprets their deeper significance.

A frightening case history is that of the German thoracic surgeon Ferdinand Sauerbruch, who became mentally deranged. You would think we had enough to contend with in hospitals without mad surgeons. Sauerbruch's eminence and overpowering personality was such that his assistants and colleagues were silenced as he pursued his relentless operating with disastrous results to his patients. He suffered from progressive brain arteriosclerosis.

A case history is a powerful stimulus to learning when used for illustration in teaching, "Leaves from my casebook" style. In anatomy lectures always popular are

descriptions of anatomy-based techniques for last-second rescues from certain death; even better are detailed accounts of *failures* with the reason always being the deplorable lack of anatomical knowledge.

Dramatic descriptions of laryngeal obstruction used to illustrate the anatomy of the front of the neck and how to get access to the larynx and windpipe go down well. Laryngeal obstruction is not rare. It is sometimes called "café coronary" when it happens in a restaurant, and is confused with a coronary attack. In one example of café coronary a half chewed piece of meat five inches long was found stuck in the larynx and windpipe. This is physical obstruction with a vengeance. Pills or peanuts are the usual cause. Café coronary is usually associated with excess alcohol with the meal or in plain speech the diner is drunk. Many lives have been saved by the Heimlich manoeuvre where the first aider stands behind the victim and squeezes the chest to dislodge the object. This will not work if a piece of meat gets into the windpipe. Waiters in the US asked to provide the Heimlich if needed refused in case they were sued if they failed. Since failure was all too likely they were wise. Steak and alcohol sometimes do not mix. When they don't the result can be death (in four minutes).

Case histories may be used to highlight problems encountered in treatment, for example, histories by talented writers who have had the misfortune to be the subject of some medical calamity. Eric Hodgins' *Episode* is a striking example. "Episode" is the name given in the U.S. to a stroke. It sounds less alarming to the American

ear. Hodgins was a sixty-year-old writer and he describes in detail the circumstances that surrounded his stroke and attending problems. The whole book is really a case history.

His episode began when he was living alone in an apartment building. The first portent by several hours was when, in the kitchen, he badly misjudged the position of the fridge door when closing it, and he nearly fell down. Later, he picked up the phone and suddenly found he was unable to speak. The handset slipped from his fingers and he himself dropped to the floor. He managed to struggle to his feet and supporting himself against the wall was able to reach the janitor who got him to a nearby hospital. This was when it might be said that his real troubles began.

Hodgins details his battery of tests in each sequence of referrals to specialists and repeated examinations, which went on for seven months. In an appendix he gives details of services and the cost. About half the number of stroke patients die almost immediately or within a few weeks, the rest may live for several years with a range of disability, from very slight to severe, whatever the treatment.

When finally on discharge Hodgins fell and cracked a bone in his hip and landed back in hospital his last rueful comment was that though he might survive another sojourn in hospital physically, he certainly could not do so financially.

Norman Cousins describes his life shortening,

"incurable" chronic collagen disease. His book deserves its status as a model of self-help. Cousins had an understanding physician who went along with the unconventional self treatment used by his patient. I gasped at the dosage he used for his medication. Contrary to his conventional medical prognosis, which was death and soon, he made a complete recovery.

Oliver Sacks describes a very nasty accident and the aftermath both clinical and psychological. This is the physician as patient and being a professional didn't do him much good. At least he escaped with his life.

In certain European countries suddenly to fall ill the danger to life may not be so much from your complaint as from the ministrations of the local healers. Take a recent example from a distant land in Europe (xenophobia creeping in) which was reported in the media: a surgeon about to operate on the stomach and presumably while rummaging around in the abdominal cavity looking for the same, discovered what he took to be a tumour, which he removed. But it was not a tumour. It was simply a normal kidney in the usual place. Here an elementary knowledge of anatomy was required to avoid disaster. The situation was made worse by the fact that the removed kidney was the only one the patient had. Normally two are present. The patient had to be put on dialysis to await a transplant. Unfortunately removal of the wrong kidney or even the wrong leg happens nearer home. But these accidents are rare. Patients have other things to worry about.

The experience of a talented journalist, Hungarian F.

Karinthy is especially striking. His book, again, is an extended case history. The English translation was first published in 1939. Karinthy's following is still so strong that the rights were taken over by Corvina Books Ltd., an English language publisher in Budapest, and the work was republished in 1992. The start of his trouble is best left to his own description which is extensive and which I have much abbreviated.

"One afternoon – it must have been about March 10th – I was having tea at the Café Central in the Egyetemter in Budapest. I had my usual table by the window, from which I look out on to the University Library and a bank. While I have no exact recollection, I suspect that on that memorable afternoon I was more preoccupied by pecuniary considerations than by a desire to instruct the public, I fully recognise however that this last should be the chief concern of the man of letters. At that very moment the trains started, punctually to the minute, at 10 past 7, I heard the first ones. I looked up in surprise to see what was happening. There was a distinct rumbling noise, followed by a slow, increasing reverberation as when the wheels of the engine begin their unhurried movement, then work up to a louder and louder roar as the train glides past us, only to fade gradually into silence.... only a minute had gone by when the next train, to precisely the same rhythm, a rumbling, reverberating and fading away. I raised my head irritably towards the neighbouring street. A few cars passed, but no other traffic. The roaring of the train was loud, insistent, continuous. It was powerful enough to drown real sounds. The waiter made some remark, and I did not

hear him".

Karinthy's symptoms continued with added headache and blurred vision, yet several physicians for weeks failed to make a diagnosis of brain tumour. This is strange since the symptoms he describes point directly to tumour. About this time and before final diagnosis he describes a film he saw made by Harvey Cushing, America's most famous neurosurgeon, operating on a patient with what Karinthy now suspected was his own trouble.

Finally, after much delay a diagnosis was made and Karinthy arrives in Sweden. Here he was operated on by the most famous of Harvey Cushing's European pupils, the neurosurgeon Olivocrona. A detailed description of his operation then follows. It should be remarked that since the brain is insensitive the operation is carried out without general anaesthesia so that the patient remains fully conscious. This improves the survival rate by 25%.

"They had begun once more to whisper above my head, but in a more decided tone. This was followed by another silence. I felt a cold touch of metal on the nape of my neck. A muffled whirring sound told me they were shaving my head. This time the clippers did not stop short at the back, as when the barber uses them to smarten one up. Around the whole length of my skull, removing the hair in swathes. Afterwards, I felt them soaping my head but by the time the razor came into play I was already bald.... For some minutes I could hear only the sound of footsteps. Then I felt a slight prick on the top of my head I felt them place some sort of blunt

instrument against my head. This looked like the real thing. There was an infernal scream as the steel plunged into my skull. It sank more and more rapidly through the bone and the pitch of its scream became louder and louder and more piercing every second. I had just time to say to myself that it must be the electric trephine. My head throbbed and roared like a 1,000 horsepower engine suddenly starting up. It thundered as if the infernal regions had opened up or the earth was quaking. I never had the chance to think whether it was hurting me or not. Suddenly there was a violent jerk and the noise stopped. The silence lasted only a moment. An inch or so further on, the trephine struck my skull and began again. I observed this second perforation more coldly for it no longer came as a surprise.... dead silence. I felt a succession of little pricks in a circle, the sharp points describing a wide circle on my head. Then, I felt one long horizontal incision at the back of my neck though this did not hurt me. I heard the tinkle of forceps being jumbled together I felt soft gestures as if my flesh were being opened and folded back. The skull was certainly exposed by now. For the third time I heard the trephine strike my skull. The noise now was more infernal and continuous than ever. I began to wonder if they couldn't get through my skull At last it stopped altogether.... there was a violent jerk followed by a crackling sound and a terrific wrench. This process was repeated. I heard a gentle comforting human voice "Wie fühlen Sie sich jetzt? "(How do you feel now?)" It must have been the voice of Olivocrona. I was surprised to hear my lips form a polite embarrassed answer "Danke, Herr Professor es geht gut" (Thanks Professor, I'm fine). The professional will notice

the obvious confusion in the sequence of events Karinthy reports. Not surprising in the circumstances.

This history with added detail was often used in lectures on the brain.

E. S. Valenstein's history of lobotomy is directed at the general reader. It is a model of clarity in a complicated subject. It is the history of a physical method used for psychological problems. "Most of the young psychiatrists watching Freeman demonstrate transorbital lobotomy in State Hospitals felt more than a little queasy during the surgery. Even experienced physicians often had a strong emotional reaction to the procedure. Edwin Zabriski, a 74-year-old professor of neurology at Colombia University had already observed Lawrence Pool perform several topectomies (excisions of small bits of the brain surface) before attending one of Freeman's demonstrations. This was at the Greystone Park State Hospital in New Jersey in July 1948. After watching the electro-convulsive shock, followed by the leucotome being tapped into the brain over the eye, and hearing the sound of the orbit fracturing when the handle was forced up towards the brow, this experienced physician fainted."

Professor Karl Kleist, Germany's leading psychiatrist of the time, was vigorously opposed to lobotomy as a mutilating procedure, a view most people would agree with. The originator of the operation was the Portuguese Egas Moniz (Portugal's only Nobel laureate). Moniz was a politician as well as a physician. Valenstein is very critical of his persistent self-promotion as well as the doubtful basis of the operation. But as he points out,

the physical method of attack (and attack is the correct description) on a psychological disorder that seemed resistant to all treatment appealed to many.

The method spread rapidly around the world. US surgeon Walter Freeman became a neurosurgeon overnight and was an aggressive and enthusiastic promoter of the operation. He travelled around the country visiting the State mental institutions calming troublesome inmates, sometimes to good effect, by reducing many to a vegetable state. Valenstein describes in detail all the fascinating circumstances surrounding this extraordinary procedure.

As a substitute for the formal case history and to remove communication and psychological problems from the patient doctor relationship real science can be applied. It was found long ago that in fact patients prefer to talk to a computer and give the history of their problems without feelings of intimidation. Computers have a much longer history in medicine than most people think. Experiments with the computer in medicine date at least from a paper by Ledley on computer aids to medical diagnosis in the Journal of the American Medical Association as long ago as 1966. Today's students in their first year in medicine may find themselves out of a job when they finish their training as GPs in eight years' time. Eight years is a lifetime in the computer world. The speed of advance is such that already a wholly synthetic doctor can be generated on the computer screen. At the moment this image is not convincing being a bit jerky in movement and with eyes of a predator. But in no time this will be

polished up and we will have a physician who looks the part and in three dimensions using already well developed holographic techniques.

The patient sitting at home will simply consult this hypnotic physician and by means of an electronic tool send him the results of physical examination. This could be done today. In response the patient will receive the latest opinion on his problems based on world research updated daily. He will have to accept a prescription if this is indicated delivered by hand since it is not going to be easy to send pills down the wire.

Hypochondriacs especially will get enormous satisfaction from the system.

Though computers can solve problems of management of patients especially in prescribing medication restriction here would certainly not be universally welcome. Drug companies would want a say in these proceedings. Consumers meanwhile must keep a close watch on these complex developments, or they may end up worse off. But no matter how the patient is dealt with, by man or machine, this must always start with the history – What's wrong? How did it begin?

The case histories reviewed are examples of risks on the way to 90 years. Can they be avoided? Yes, I think they can and in another chapter I will dispense the information that shows how.

CHAPTER 6

A NASTY EXPERIENCE TEACHING SOMETHING NEW TO BRAINS FIXED IN CONCRETE

Scientists are not the calm, objective assessors of the new and unexpected as many assume. They may disagree but they are supposed to do so without flying into a rage.

Everyone looks forward to reading literary reviews nearly always balanced and informative, though I admit I am astonished by one recent critic who objects to the use of the present tense and the word astonished. Theatre and music critics are sometimes hard to please. But in some popular science an extra charge is added to opinions on merit. Anything on Freud or Darwin is enough to make some critics explode. Fabrication of a text that is then hacked to bits is something popular science writers have to put up with.

In the commercial sphere representatives of the sugar industry subjected J. Yudkin's book on refined sugar to vituperative and destructive criticism. Understandable of course from purveyors of a product added to nearly all processed foods which means it is consumed in prodigious quantities with proven damage to the consumer. It certainly can have a detrimental effect on the lifespan.

The author of one of the best recent popular and

comprehensive books on language, well-known researcher S. Pinker records being subject to sarcastic mocking and totally misunderstood reading of the results of a piece of research (which was perfectly clear) given at a conference of the AAAS (American Association for the Advancement of Science). For good measure his assistant Gopnik received a share of the same. This happens when the delivered information is unpalatable. I have a fellow feeling for those subjected to this kind of thing having been on the receiving end myself.

The experience described here happened 50 years ago at a science conference. It is safe to say that none of the 40 or 50 participants will be embarrassed (or made even angrier) by this digging up of the past. The memories of those above ground today will be far from clear as to what really happened.

Some months before the conference a paper published in a reputable U.S. general science journal revealed that in groups of college students scientific thinking was seriously deficient on fundamental aspects of the natural world. The results seemed unambiguous. The students' ideas were identical with those of children, or the people of New Guinea and indigenous Australians before much contact with modern civilisation. Having a supply of students whom I occasionally used for experiments when anything came up worth looking into, the test was applied to them. Obviously to me the result would be different. On the contrary the result was no different.

The conference participants were biological research

scientists with one important elder to lend weight psychological and physical. I was asked to take the chair for the morning session out of politeness as the host. As the last paper before lunch a staff lecturer delivered the findings of the experiment as his own contribution. The reaction was immediate. The most important senior took charge and launched into a sarcastic tirade directed solely at me. I had obviously masterminded the whole thing. The lecturer was bypassed. The audience was totally behind the critic, laughing at his quips at my expense None made any contribution of their own, obviously satisfied by the demolition. At the end of the vitriolic assault I thought it wise to remain calm, which I did, being a bit stunned.

How to explain this response to a repetition of a published test on a cultural phenomenon, changed only by the substitution of medical students instead of science, liberal arts or other groups as subjects? Publication of the result was not considered since it was merely a rather trivial variation (even though as everyone knows triviality is not always a hindrance to publication).

The following is a transcript of the paper as delivered and the reader can judge if an emotive and hostile response is justified. I believe some will still say yes.

Scientific Knowledge And Animistic-Anthropomorphic Thinking

Anthropologists, psychologists and historians of science are familiar with animism and anthropomorphism.

These beliefs are the rule among tribal peoples and earlier cultural epochs. Animism means the attribution of a living soul to inanimate objects and natural phenomena. Anthropomorphism is the ascription of a human attribute or personality to anything impersonal. Certain objects may be regarded as living simply because they are in motion or where energy is produced by them. Animistic thinking has been studied in modern cultures. Piaget found animistic thinking is the rule up to 12 years of age. An extension of these studies was made by Dennis in older age groups, 70 years and upward. Here 75% of such persons of normal intelligence were found to think animisticly, that is, to a series of questions that required the answer "living" or "non-living" the majority gave the answer "living" to one or more objects. The objects were:

1, unlighted match. 2, the same match lighted. 3, electric clock. 4, the sun. *5*, the wind. 6, clouds. 7, a pearl. 8, petrol. 9, the ocean. 10, lightning. 11, stars. 12, the earth. These words were designed to test animistic thinking.

To test for anthropomorphism the following three questions were asked:

1, many ships are lost at the bottom of the sea. We cannot find them. Do you think the sea itself knows where they are?

2, a pearl was once in a shell in the sea. When the water moved, could the pearl feel the movement of the water?

3, the tides are caused by the pull of the moon upon the ocean. Do you think the ocean can feel the pull of the moon that causes high tides?

The interpretation of the results in a group of old persons was that they did not fully understand the meaning of the questions because of some degree of age related mental deterioration. A further study by Dennis on teachers who were on coursework, most of whom already possessed university degrees, found that 45% were animistic thinkers. Extending the study to students of child psychology, animistic thinkers reached 48%! In the interpretation of these results it might be said that the students were being poetic, philosophical, or whimsical. But direct questions revealed that in fact they meant what they said.

Trying to find some group who did not think animistically, a class who had just completed courses in physics, chemistry and biology were tested. The biology course included information in which the difference between animate and inanimate had been made explicit. In spite of this, 12% gave animistic answers. Dennis concludes that though training in science reduces animistic thinking, it does not abolish it. This means that in the absence of specific instruction many, probably 50% of educated persons in society, have concepts of the world identical with those of children and tribal societies.

When my students were tested animism or anthropomorphism had not been mentioned in their basic science or medical courses. Results were that 18% were animistic thinkers, and the proportion of animistic to

anthropomorphic thinking was 3 to 1. This proportion is the same as that of Dennis. The paper was then open for discussion but received a violent assault instead.

I have not bothered to look up present opinion of these observations made so long ago. How they are viewed today is simply irrelevant to what is described here. The point is the reaction of a science group when unexpectedly presented with an unfamiliar though well documented result of a piece of easily understood research. Today, the majority would probably describe the earth as "living". But at that time the earth was considered a planet, obviously non-living itself, but impregnated with adventitious biological material. It is no different today whatever the names used to describe it. A test tube filled with a culture of 6 billion living bacteria doesn't make the test tube itself living.

I am embarrassed to say that it took me a week instead of five minutes before the explanation dawned. I am not going to say what I think the explanation was because it is certain that the explanation itself would unleash another barrage of abuse from some though much smaller sections of the population. Others would just burst out laughing.

As for longevity it is well known that primitive people of the past harboured the ideas I have just described. And what happened to them? Most didn't live 50 years. The lesson is obvious. Spring clean the brain and clear out primitive ideas. Start thinking scientifically and double expected lifespan.

CHAPTER 7

IS ROAST TARANTULA PERMITTED TO VEGETARIANS?

Before you say "absolutely not – a ridiculous question. Spiders are animals as everybody knows" we have to ask what distinguishes spiders from insects which they so closely resemble and for which we can made a case for human consumption, certainly for most vegetarians. Spiders have eight legs instead of the insects six. So the difference boils down to a pair of legs. Even if spiders share with us more than half their genes this is not an argument against eating them. We share quite a few genes with bananas. Should we therefore give up bananas? So the question is answered – it *is* permissible for any reasonable vegetarian to snack on roast tarantula.

Pushing an aged cow that has ceased to be productive into one end of a machine the size of a house and eating what comes out of the other end, though environmentally friendly (no waste) is not aesthetically appealing, or healthy. I belong to that small but growing proportion of the population who believe the right and proper thing to be is a vegetarian. For some this admission of the unconventional will inflame. "Vegetarians have wicked shifty eyes, and laugh in a cold calculating manner. They pinch little children, steal stamps, drink water, and favour beards". This often quoted piece by Beachcomber of the Daily Express reflects the universal view.

Excommunication was the usual treatment for vegetarians in the past. A reason sometimes given is that there is a symbolic significance attached to group consumption of meat. Refusal to participate is dissident and shows hostility to established society.

Vegetarians sometimes have peculiar views on food. One early practitioner, Pythagoras, in his advice on diet, without giving a reason, expressed the most strongly negative views on the consumption of *beans.* According to Tannahill upper class Greeks and Romans at that time believed that beans represented the souls of the dead. As far as I know no explanation has ever been offered for this curious belief. Could it be that these rationalists noted the well-known propensity of beans to produce wind and deduced that the noisy language was the protests of souls displaced?

J. Davidson describes ancient Greek diets in detail, and discusses the serious problems the Greeks had with alcohol. But he has nothing to say on their problems with beans. The Greeks were clearly obsessed with fish, which they consumed in astronomically large amounts. Davidson also mentions in passing the widespread Greek males' excessive interest in young boys. Today for some of such activities, even in these permissive times, perpetrators would be arrested. Can there be any association here with the amount of fish in the diet? I advise moderation, just in case.

But let us start with a more highly charged subject than beans, fish or unconventional habits. Can we

consider insects as a suitable addition to diet for vegetarians? Some eat fish. From a scientific point of view insects are closer to vegetables than fish. In many cultures insects are an important part of diet. In Europe the Germans are the most adventurous with several restaurants specialising in this area.

Bristowe, the well-known English entomologist, describes trials of the tastiness or otherwise of spiders as snacks. In an early Journal paper of 1932 he has a detailed description where he says "some (insects) fetch high prices and the capture of others is fraught with considerable risk" (i.e. presumably from venomous snake bite) "so we would like them if they were suitably disguised, and if we gave ourselves the chance of acquiring the taste. By ourselves eating spiders, dung beetles, water bugs, crickets, grasshoppers, termites and cicadas, we found none distasteful, a few quite palatable, notably the giant water bug. For the most part they were insipid, with a faint vegetable flavour, but would not anyone tasting bread, for instance, for the first time, wonder why we eat such a flavourless food? A toasted dung beetle or a soft-bodied spider has a nice crisp exterior and soft interior of soufflé consistency that is by no means unpleasant. Flavour is exceptionally hard to define, but lettuce would, I think, best describe the taste of termites, cicadas and crickets: lettuce and raw potato, that of the giant *Nephilia* spider, and concentrated Gorgonzola cheese that of the giant water bug (*Lethocercus indicus*)". It should be remembered that most of the various insects mentioned are generally much larger than those we are accustomed to. Two or three

inches are common, so there is a substantial bite in just one.

Bristowe describes the collection of the big dung beetle. They are dug out of the ground when the cuckoo begins to sing. Various species of grubs found in the droppings of cattle in the rainy season are collected, cooked and eaten. Silkworms are popular everywhere and usually eaten fried. The author remarks that it was delightful to see little children come begging for pupae from silk reelers.

Some say the taste of locusts boiled in oil resembles that of periwinkles. Gourmets in this area as might be expected, say the taste is that of caviar. Less attractive than caviar is the description of a species of bug from a riverbed "which was fried in oil and eaten despite their horrible odour". Similarly, the *Dytiscid* beetles dropped in hot brine become very greasy with a smell even more offensive when cooked than when fresh. Anyone thinking of adding insects to their diet would best not start with these.

Every book on healthy living is largely concerned with advice on diet. But the components vary and though the diets appear simple, they are difficult to carry out consistently. Changing the average western diet with the exclusion of the excess of its well known most dangerous components, will change blood chemistry for the better in less that 6 weeks. But permanent protection from the dangerous properties and consequences of the average western diet needs years to effect. Cancer of internal

organs and widespread damage to blood vessels are largely diet related. Fundamental pathologies once established are not reversible. Some internal cancers take from a matter of weeks to 6 or 7 years before they attract attention. Then heroic measures are taken (heroism from the patient that is) with the common outcome of a few months or years of living under threat. Cures are defined as non-recurrence within a defined period, often 7 years, but this depends on the type of cancer. An early enough switch to a healthy diet can reduce the incidence substantially except in a few rare instances.

Diet has to be balanced to maintain optimum health. This means quite severe restriction of components well known to be harmful, chiefly fat, sugar, salt and alcohol. Evidence from primate evolution and early man shows the diets on which the whole alimentary system developed. This conservative system does not respond to change quickly. The picture is complicated by the ever-increasing consumption in the 20th century of over the counter medicinal chemicals of all kinds. Aspirin is far from harmless, in spite of the fact that thousands of GPs were persuaded to take it for years to see how much it reduced heart attacks. It did, but there are safer ways of avoiding a heart attack.

An expert on food science who was challenged on the chemicals added to food responded by saying that all food consists of chemicals so why complain? He made no distinction between normal food chemicals and those of the chemical industry, for example the aniline dyes, which are not. These dyes are used solely to improve

appearance and tempt the consumer to buy. They are usually used for dyeing cheap leather, carpets and rugs. They are well known in the trade to shorten the life of these materials. When added to diet they may well do the same for the life of the unwary consumer.

An old practice is spraying dried fruit with mineral oil. This is easily detected by the shiny luscious appearance it gives to the fruit. Most foreign chemicals when not excreted have to be dealt with by the liver and kidneys that have no inbuilt natural mechanisms to deal with chemicals created in the laboratory. Occasionally we have experts who say today's foods are perfectly safe and complaining about pesticide content is simply alarmist. Up to a point this is true. The amounts in food of all kinds are minuscule. The largest mixed salad will not result in sudden death, though there are examples of consumers ending up in hospital from pesticide over spraying. But certain chemicals in minute amounts have been shown to have undesirable properties. They have an affinity for fats where they gradually build up. This has been known for years. An essential and large component of brain tissue is a fat compound and these poisonous materials are fixed in this fat. DDT was one. Marijuana though not a food, provides a good example of the consequences of the intake of substances with fat affinity. The unpleasant consequences take years to develop. There are similarities to the pathological response to tobacco. But there is an important additional hazard. Damage is gradually inflicted on two vital parts of the brain. From youth to middle age subtle mental deterioration imperceptibly develops. This is not easy to

recognise in themselves by the mildly demented. But so long as they are happy they may think it is worth it. I would not think so. If marijuana was legalised the disastrous results would not become apparent for a generation, and just as with tobacco, very difficult for society to deal with.

To move on from this aside on the drug trade I can report that even health food products are not immune to extraordinary additives. Three or four years ago a very well known provider of fish oil capsules had surprising information on the package. One component was ethylene glycol. I asked the pharmacist if she knew what this was. Somewhat to my surprise the answer was no so I informed her that its common name was antifreeze. This additive had not long before been used by some greedy wine producers in Austria to improve the palatability of inferior wines to get better prices. The really extraordinary feature of this incident was their attempt to get tax relief for the large quantities of the chemical used. This drew attention to their activities. Greed has no limits. The perpetrators received stiff prison sentences. A few months after this report antifreeze disappeared from the label of the pharmacist's stock. I don't know if it disappeared from the product. The addition seems pointless since the capsules are swallowed whole, so contribute nothing to taste.

Vegetarian and fish diets are not without dangers, long term. An amazingly large number of pesticides and other foreign chemicals, mainly industrial pollutants are present in many foods. They number from one with one

part per billion all the way up to hundreds classified as dangerously large amounts. Though banned for years DDT is present everywhere because of resistance to breakdown. Today it is not a hazard. More serious is the industrial pollutants especially the organophosphates which have some biological activity in very low concentrations, a few parts per billion. The U.S. food administration agrees that fish from the Great Lakes should be banned because of industrial chemical load. In spite of this they were not because of the effect on the fishermen's livelihood.

Pollution here has been reduced recently. To add to the good news, another reduction is the practice of spraying mineral oil on dried fruit to improve appearance. Some foods are especially high in pesticides. The usual example given is peanuts that are sprayed in storage, often several times to prevent fungal growth. Raisins also are particularly high, but many foods are low and safe. The problem is – which?

Some E numbers in packaged foods are harmless, even beneficial, vitamin C for example. The answer to problems of contamination of diet is organic food.

The essential counterpart of the vegetarian diet is exercise. Exercise has a menacing sound to the confirmed sedentary, which means 40% of the population, and rising. If of correct weight and normal build, with legs straight, anyone should be able to place the palms of their hands on the floor. The average person over 30 falls far short. They cannot even touch their toes. Just to advise

anyone to exercise is rather pointless. Exercise has to be defined in relation to the individual. Besides, there are different regimes for exercise depending on what the individual wants to achieve. This must be to increase general muscle strength, stamina and especially flexibility. Nowadays men under 30 years or so often want to increase muscle mass. But contrary to what might be thought this does not mean increase in fitness. Fitness should be the primary aim of all ages. Used correctly, exercise improves health, feeling of well being, and will prolong life.

Programmed exercise varies widely, depending on age and physical condition to start with. Programmes can be followed without disturbance to normal daily routine. They can become more or less automatic. Exercise doesn't need elaborate apparatus. Walking is one of the best exercises but only provided it is carried out at enough speed, at least 3mph. Marching speed is 4mph. Description of exercise methods and detailed advice are described by N. Carruthers and A. Murray. Pictures of each step show exactly what to do. L. E. Morehouse and L. Gross point out the fallacies and myths about fitness that most fitness books don't even mention. Even today, some elements of training or advanced forms of exercise, known for the past 20 years to be undesirable and even harmful, still persist in fitness advice books and columns.

It is healthy to start the day with a cold shower. The ancient Romans did so and conquered the world. About ten seconds cold will do, and then follow with a hot shower. Never reverse the sequence. Recently one

healthy 40 year old finished with a cold shower which many do but when the freezing jet struck his chest he fell dead from cardiac inhibition. A few recoil at the idea of daily cold showers but there is evidence that they improve resistance to common infections. Can you get acclimatised to immersion in cold water? My impression is that you can, to a degree. However, there seems to be limits. Royal Navy researchers carried out experiments to see if acclimatisation is possible. They threw a number of other ranks overboard into the ocean off the coast of Iceland. They concluded that acclimatisation did not take place. The sudden shock of this extreme action means that the conclusion is probably correct. I do not recommend plunging into icy seawater, which some people do voluntarily for some incomprehensible reason. Such extreme measures are not necessary to maintain health.

Governments everywhere are afraid of those in command of the agricultural industry, formerly referred to as farming. Organic producers complain that they get scant support whereas ordinary farmers get billions. The reason is obvious. Powerful chemical corporations have large investments in artificial fertilisers and pesticides. Farmers like them because farming is much less troublesome by their use. More controversial is control of patented genetically manipulated seed. These have long been in use and are outside the possible dangers in the newer transgenic manipulation. By means of patents in recent years the U.S. chemical corporations control farmers who are equivalent to employees of these corporations. It is a perfect arrangement. If a crop fails

the farmer takes the loss, not the corporation. Governments do not promote organic farming and of course nor do they promote vegetarianism because of damage to the meat industry. There are those who would stop the growth of vegetarianism altogether. If you think that this is an exaggeration I can point to the fact that the Nazis early in their seizure of power closed down all vegetarian publications and prohibited all mention of vegetarianism.

If vegetarians reach a critical mass, who knows what disasters might ensue for the very profitable (for some) business enterprise we are all concerned about – health care delivery in all its complex manifestations. One immediate result would be hospital expenditure that would be cut by two thirds, at least. Think of the economic consequences of that. On the other hand think of the benefits.

CHAPTER 8

NOBODY WANTS TO KNOW THE HISTORY OF ANATOMY

Today there is too much of importance in the curriculum for students of medicine to absorb without wasting time bothering about what happened in the past. Doctors only read books on medical history long after graduation. As for the history of anatomy this is a closed book to practically everybody. General histories dispense a few crumbs. Mention of the most famous anatomist of the Renaissance Andreas Vesalius can hardly be avoided in general medical histories because of his enormous impact on medical practice. A book on the history of anatomy was published in 1925 and re-issued in 1956 – otherwise, silence.

To begin with one of the earliest skilled anatomists, the Pepsis wasp: Having manoeuvred a previously hypnotised tarantula into the desired position she places her sting exactly over the protectively located thoracic nerve centre and injects just enough venom to avoid killing the victim but enough for prolonged paralysis. This allows time for development of the egg she will then implant. We have a parallel in today's hospital pre-operative sedation when a virulent poison is added to induce total body paralysis, euphemistically called a relaxant to keep the patient quiet.

One of the earliest civilisations with developed

health care, Mesopotamian medicine, had no interest in anatomy except in one area. This was the liver, which was used by a special kind of fortune teller called a Haruspex (whose speciality of course was haruspecation). Clay models of the liver variously marked were used in the ritual of prediction of the course of a disease. These clay livers were even kept in special reference libraries. Later, the Haruspex achieved prominence in Roman society as a fortune teller. Needless to say he had to be skilful in dealing with clients like Nero or Caligula.

About 900 BC the snake first appears as a symbol in medicine. Representation of a snake in other contexts is found among the Babylonians, Egyptians, and Aztecs and in Buddhism. Today we see this symbol frequently, and often wrongly applied. It appears as a rod or staff with either one snake or a pair entwined around it. There is a significant difference in meaning between these two images. In ancient Greece the staff was called a caduceus. This was an olive branch carried by a herald and signified peace. Mercury, among other functions, was ambassador of the Gods and as such carries the caduceus with two snakes entwined. This represents Mercury separating two fighting snakes and signifies neutrality. It has never signified medicine.

The staff with one snake is that of Aesculapius. The origin of this symbol in its relation to medicine derives from the attendance by Aesculapius on Glaucus who had been struck by lightning. While examining the corpse a snake entered the room. Aesculapius killed the snake with his staff. Then a second snake entered carrying a

herb, which it applied to the dead snake. It was at once revived. Aesculapius collected some of this herb and when he applied it to Glaucus he too was restored to life.

Aesculapius was a real person who was later deified. The snake is also real. It is the *Coluber Longissimus Aesculapii* about two metres long in a warning yellow and black. It is in fact non-poisonous. Aesculapius had assistance, which is not unexpected, from two of his four daughters, Hygeia and Panacea. Panacea is still active but Hygeia receives scant respect today especially in fast foods outlets and hospitals according to the latest alarming reports.

In 300 BC a centre for Greek science was established in Alexandria. Among the earliest anatomists was Herophilis who is always mentioned in any history of medicine. Among many things he wrote on the causes of sudden death from heart failure, one of which was triggered by a tooth extraction. He described the membranous coverings of the brain and the venous channels contained in them. Where these veins meet inside the back of the skull was formerly known as the Torcular Herophili. I say formerly because more than fifty years ago a congress of anatomists met to standardise anatomical terms. They took thirty years to do it. No doubt it was believed to be a worthy project to make the terminology international, but in the process all the historical names attached to structures (eponyms) were abolished. But the use of eponyms personalises the history of anatomy and medicine and anyway, nobody had any difficulty understanding French or German

terminology. Here are a few which were in common use and which were banished forever from anatomy textbooks though not completely in practice by a committee without any feeling for history.

Ducts of Cuvier – this French anatomist of the early 19th century became president of the Council of State. He gave his name to the veins going to the heart in the foetus. *Dupuytren's fascia* – this is a layer of tissue in the palm of the hand subject to surgical attention when disordered. *Eustachian tube* – Eustacius was a 16th century anatomist who was also physician to the Pope. He described the tube between the back of the nose and the middle ear, a connection known to air travellers. When air pressure drops even slightly and the tube is not open the eardrum is pushed outwards. On swallowing muscles open it and the drum clicks back in place as pressure is equalised. *Fallopius* in the 16th century first described the uterine tubes that he said mistakenly were chimneys for the escape of sooty humours from the womb. *Islets of Langerhans* – a 19th century anatomist who described the cells that produce insulin to control sugar metabolism. *Foramen of Vesalius* – an opening in the skull transmitting a small vein. This and a small bone in the foot were the only structures with the name of Vesalius attached to them and both are inconstant. Vesalius was founder of modern anatomy in the 16th century and primarily responsible for the advancement of medicine and surgery. *Duct of Wirsung* – this anatomist in 1643 was stabbed to death in a dispute over priority in the discovery of the duct of the pancreas that conveys digestive juices to the gut. Priority in publication is taken

seriously in the anatomical world.

Another physician whom everyone has heard of is Hippocrates. The problem here is that there are at least six persons in these early times with the same name. To one the *Hippocratic Collection* is attributed without any evidence that the physician contributed anything to it. The so-called Hippocratic Oath is administered in a few of the newer medical schools today. This oath is unlikely to have any connection with Hippocrates since it is said to be foreign to Greek ideals of the time. It is easy to see that the Collection is bits and pieces by different authors because the quality varies widely. Some have good descriptions of effective treatment for injuries of various kinds. But generally, Hippocratic medicine was no better than 19th century European practice. Purging, starvation and bleeding was the first line of attack on disease. Under this regime many patients expired who would have survived if simply left alone. Or the equivalent of being left alone: For example, by the laying on of hands, healing vapours or incantations, treatments practised everywhere today in the Western World. These are sometimes successful but only thanks to Panacea and her indispensable assistant, Placebo. As for Hippocrates' advice on diet, if followed it would seriously damage your health.

Almost as well known in history as Hippocrates is Galen, who was physician to the Stoic Emperor Marcus Aurelius, Commodus and Septimus Severus. He was also physician to the gladiators at Pergamos for several years around 150 AD. As a result of this service he made many

discoveries on the results of injury. His observations on anatomy were in advance of anything known before. He wrote several hundred books on many subjects. It took nearly 2000 years for one of his predictions to be realised. This was that when that part of the air that supports combustion was discovered, then the source of body temperature will be known.

The problem with Galen's descriptions of anatomy was that they were based on animal dissections, and therefore not strictly applicable to human anatomy. He dissected not only primates, but also a range of animals from elephants to mice. His works were sacrosanct for centuries and it was only in the Renaissance that his many mistakes were pointed out. Nevertheless, Galen's observations on the results of trauma can be seen all too often today. He describes the consequence of injury to the spine suffered by the gladiators. Damage to the neck at the level of the first and second segment of the spine (cervical vertebrae) caused death; injury to the third and fourth arrested respiration; below the sixth caused paralysis of the chest muscles, but breathing could be continued by the diaphragm. This muscle has a special nerve supply. Below this level the result was paralysis of the lower half of the body.

Surprisingly Galen was a firm believer in astrology, even though Marcus Aurelius was hostile to it. The practice was widespread in Rome. It was even described as a craze. It is still widespread today. Another case of failure of education.

About this time disaster struck the field of learning. This was the destruction of the greatest cultural heritage of the ancient world, the great library of Alexandria. Gibbon says the Christians were responsible. The Arabs are usually blamed. But all the evidence points to the Roman Bishop Theophilius who incited the mobs to burn the library and the contents in AD 391. The hundreds of thousands of volumes were in several locations and it took some time. Book burning tells us more about the perpetrators than they want us to know. I am sorry to say the Arabs added more destruction two hundred years later.

About 700 AD a number of Greek works on medicine were translated into Arabic. Reference to Arabic medicine means that the books were written in Arabic. The Arabs made little contribution to medicine. Advance came from the Syrians, Hebrews and Persians. The Syrians later carried out most of the translations from the Greek to Persian, and later to Arabic. At this time every educated person was expected to take an interest in anatomy. This is reflected in the large anatomical vocabulary in Arabic.

Though it is accepted in the Islamic world that science is the remedy for the infirmities of ignorance yet representation of the human body is subject to interdiction. This had no effect on anatomy since before the Renaissance illustration played no part in anatomical instruction. The interdiction incidentally explains the specialisation of Islamic artists on architecture, ceramic art and decoration.

In Europe no centre for the study of medicine existed for the first ten centuries of the Christian era.

The first was at Salerno and the teaching was based exclusively on Galen. It was not until the 12th century that dissection began at Bologna. This was not for medical reasons, but to provide evidence for legal proceedings since Bologna was a law school. Dissection for the teaching of anatomy began with Mondino of Lucca in 1315. His book on anatomy became famous in Europe and was the first with illustrations. When dissection was performed to discover the cause of death in suspicious circumstances it often had to be carried out in summer. In the Italian climate this means putrefaction was accelerated. Thus there must be no delay, or evidence disappeared. For teaching, even in winter, without preservation the rule was that dissection should take place within 5 days.

Books on medical history always describe the origin of the University Chair. In Mondino's book an illustration shows how this derived from the teaching of anatomy at the end of the middle ages (Fig 1). The professor is seated on a raised desk reading from the works of Galen. Below, the corpse lies on a table with a dissector bending over the subject, holding a knife. This is the surgeon who was looked on as an artisan. Standing beside him is the demonstrator with a pointer to indicate various features being called out by the professor. Some descriptions refer to the individual with the pointer as the professor, which cannot be correct.

Fig.1 The first illustration to appear in an anatomy textbook in 1315, redrawn and coloured by the author. The original was a woodcut.

Some 200 years later the anatomist Vesalius had a few critical remarks to make on this arrangement as quoted in translation by B. Farrington "Where the professor reads from a book, these latter are perched up aloft in a pulpit like jackdaws, and with a notable air of disdain they drone out information about facts they have never approached at first hand, but which they merely commit to memory from the books of others. The dissectors are so ignorant of language that they are unable to explain their dissection to the onlookers and botch what ought to be exhibited in accordance with the instructions of the physician who never applies his hand to the dissection and contemptuously steers the ship out of the manual, as the saying goes. In the confusion less is offered to the onlooker than a butcher in his stall could teach a doctor."

Up to the Renaissance writings on anatomy were only parts of books on medicine. Mondino's book is said to be difficult. I have not attempted to read it. He gives the same part different names, or the same name for different parts. Most names of parts are today derived from Latin or Greek. This became usual from the 16th century onwards. Only a few names remain of Arabic origin. For example, retina, which seems obviously of Latin origin, is not derived from the Latin rete, a net; the saphenous (vein) in the leg is not from the Greek meaning clear; the sesamoid (bone) refers to "open sesame" taken from the adventures of Aladdin.

Singer describes Mondino's treatment of an open wound where he says that the edges should be joined by

making ants bite the edges together and then cut off their heads. Singer thinks that this is utterly ridiculous and cannot possibly be true. He had not heard that in America and Africa the practice was widespread and had been for a long time. It was also effective. I well recall that in the 30s some abdominal wounds were closed by stainless steel clips only slightly larger that the army ants' pincers. It was quicker to close a surgical wound than to use sutures and they were quicker to remove. Majano, a physician with much experience in primitive medicine, says he had not believed that this use of ants for wound closure ever took place until he researched the subject.

A few rare anatomical diagrams were in circulation in the middle ages. Sudhof showed in a set dated 1158 that these were not based on dissection directly, but were copies of much earlier diagrams. They were arranged in sets of five, which represented the skeleton, muscles, nerves, arteries and veins. They were passed down directly from antiquity from an illustrated Alexandrian textbook of anatomy written in Greek. Up to the early 16th century physicians had no use for illustrations since all information was by printed word. It was in response to the interest of artists that Leonardo da Vinci produced a series of anatomical illustrations. Because of complexity human anatomy requires illustration. Da Vinci's methods are surprisingly modern in approach in the use of cross sections, superimposed layers, transparencies that presage the radiograph, and investigation of hollow organs by wax injection. Unfortunately his work was unknown until long after his death.

The drawings came into the hands of Orazio Melzi, a lawyer in 1520, from Leonardo's heir Francisco Melzi. Some of these were stolen from the lawyer and some given away. These were later recovered when Orazio realised that apart from artistic and scientific value, they were also of monetary value. Belt reports that there are 600 drawings by Leonardo of anatomical interest in Windsor Castle. When counted in 1761 there were 779.

The Duke of Tuscany in 1550 handed over a criminal to the medical faculty at Pisa to deal with in any way they thought fit. This happened in other places and led to the accusation of human vivisection by anatomists. This was always denied. I do not think it ever took place. Dissection and vivisection are two different things. One is slow painstaking unveiling of the facts of structural relations, and the other to reveal function. In the history of the period physiological knowledge, which could only be derived from vivisection, is absent.

A book appeared in 1543 that laid the foundation of modern medicine. This was the *Structure of the Human Body* by Andreas Vesalius. The woodcut illustrations which accompanied the text were superior to anything previously known, and were accompanied by a text which was revolutionary. This corrected previous works of long tradition dating from the anatomy of Galen. As usual with anything that breaks with tradition, the book met with hostility. The identity of the artist of the illustrations was soon in dispute, which continues today. They were first attributed to a minor Flemish artist, Kalcar. A recent history of medicine states categorically

that Kalcar is the artist. This is extraordinary because plates of the skeleton known definitely to be by this artist show an unbridgeable gap in skill between these and the main series. I have studied Titian's painting and will say with certainty that except for the skeletons by Kalcar the figures illustrated in the book of Vesalius are by Titian. Besides, it has been pointed out that the landscape in one series of plates on the muscles is that of the countryside near Padua, and is the work of Titian's landscape artist. Does it seem likely that a mediocre unheard of Flemish artist could produce the magnificent series on the muscles of the body while Titian's only contribution was the background?

About this time a two volume book on anatomy was completed by a less well-known anatomist but unpublished and without illustrations. This anatomist was Spegilius. When it was decided to publish, illustrations were prepared by the most skilled artists and publication followed in 1627.

A physician friend of mine saw one of these illustrations and wanted to know more about Spegilius. Books to hand consulted on the general history of medicine had nothing to say about him.

So to the Internet. At once information was forthcoming. But information, however voluminous, can still be deficient.

In the case of Spegilius we have full name and variants, dates of birth and death, occupation, education,

travels, appointments and the names of his two books. All more or less mundane facts. Knowledge of the significance of Spegilius in medical history is absent.

For his book not only were the best artists used for the illustrations but these were made in copperplate and not woodcut, the standard of the time for anatomic illustration. The excellence of Vesalius's illustrations was surpassed by the much greater detail copperplate could render and accurate detail is what matters in anatomy as in any subject. The result was a stimulus for the transmission of new information and a surge in the advance of medicine.

Discovery in 1553 of the circulation of the blood through the lungs (pulmonary circulation) by Servetus, a French anatomist, laid the foundation for the discovery 70 years later by the main figure after Vesalius, William Harvey. Harvey was the first to give a complete description of the circulation of the blood. His description is hard going, both linguistically and logically. I would compare him with Kant in the comprehension scale. Servetus, for his pains, was burnt at the stake by the revered Calvin who fortunately wasn't around to deal in the same way with Harvey.

Circulation of the blood was a union of anatomy and function. This union continued up to the end of the 19th century when function became detached from anatomy and was taught as a separate subject, physiology. Further fragmentation took place when biochemistry, which is part of physiology, became another separate subject.

In the last 50 years anatomy has been squeezed by the demands of other subjects for time on the curriculum. This was carried so far a few years ago in the U.S. that anatomy teaching had to be expanded. Retired anatomists were recalled to stem the dangerous decline in knowledge of the foundation of all medical practice. In spite of this one recent medical critic of the curriculum, and these are not wanting, recently proposed not just reduction but elimination of anatomy from the curriculum. The reason he gave is that it is a waste of time. We have heard this before. A few though given information never acquire knowledge, unfortunately.

If anatomy is eliminated then physiology and pathological anatomy, which are closely integrated with anatomy, might as well go too. Again, let us turn to history. When human structure, function and the disease processes (pathology) are unknown, and remain unknown, the result is an unchanging therapy by magic, folk medicine and the shaman. Examples of each of these practices can be seen in Western society today under various guises.

This brief description of the history of anatomy is a modified version of the first lecture given to students on their first day at medical school.

What has all this anatomical history to do with ageing? Not a lot, but any knowledge of history on any subject is never wasted. It might be better to have a wise physician (he does exist) than a shaman when sudden abdominal pain strikes.

CHAPTER 9

EXTREME FLEXIBILITY OF HUMAN ANATOMY IN ART

Human anatomy is the foundation of both medicine and art. In medicine anatomy is applied, in art it is transformed. Human anatomy can be excluded from art by the substitution of the purely abstract. All art is abstract in one sense, but to regard the abstract itself as art is a modern phenomenon. It has been pointed out that the result is the necessity for an intermediary, that is, the expert or critic to explain the work. But criticism of a work of art is strictly not meaningful. It is merely an expression of the taste of the critic. This is why critics disagree with each other over aesthetic values of a work of art.

Starting in the twenties but fully developed in the fifties critics denigration of Rodin was general in the art world. In the late 19th century and early 20th century Rodin was regarded as the greatest sculptor of his time. Some would say the greatest since the genius of the Renaissance. Again, the sculptor Jacob Epstein was subject to extraordinary and unremitting hostility that continued for decades for reasons that are hard to understand. Only late in life was his rightful place established.

The growth of abstract art had a lot to do with the fortunes of these artists. It may be significant that

Duchamp, said to be one of the most important revolutionaries in modern art, overlaps Rodin. Duchamp's masterpiece, a piece of bathroom hardware, is often reproduced as a landmark in modern art. But it was meant to provoke, something we see today carried to ever greater extremes.

The art forms of anatomy are Naturalism (the individual) and Realism (the typical form). The artist transforms anatomy in two ways: by abstraction and by distortion. Representation of the figure, which has a marked abstract element but is charged with meaning, can be seen in the bronze sculptures of Marino Marini. This modern master is well known for his horse and rider sculptures. One of his works introduces an element often seen in ancient Greek and Roman art, but which is rare today. The population today will accept anything from the Classical world exactly as the Victorians did, but are much less tolerant of the same in a modern context. Marini's contribution is found in one of his energy charged horse and rider pieces. The rider is complete with an erect penis that can be screwed off (or on), as occasion may demand. It even forms a natural central focus in the composition.

Another sculptor G Manzu who is well known for his female dancers has less abstraction, but controlled distortion. He can produce a powerful effect of timelessness in his over life size figures. Henry Moore combines much of both in varying degrees in his monumental figures. Naturalistic portrait sculpture can carry a surprising impact. Some fifty years ago it was

reported in the press that a farmer had dug up an ancient Roman bronze head. It turned out to be a portrait of Claudius and it was loaned to the British Museum. It was subsequently sold to the Museum for £14,000 as far as I remember. Something of a bargain. When one comes suddenly face to face with the black just over life size head it seems to transport the viewer back to Ancient Rome. I would guess the sculptor was Greek, many of whom worked in Rome at that time. In the Roman collection there is a somewhat damaged porphyry head of Pompey also probably by a Greek sculptor.

It may be suggested that in purely abstract art, cynicism, that is commercialism, underlies the production.

But this is not always correct. As reported by Arnheim, Lipschitz visited the studio of Juan Gris and saw a picture on the easel described as a cubist work, like a heap of building material. Lipschitz explained that Gris should not touch it – the painting was complete and perfect. The response of Gris was an angry outburst saying that it was obviously not finished – still to be added was part of the moustache. This could be said to be similar to the uninitiated looking at a radiograph of the head. Misunderstanding is to be expected.

As well as abstraction and distortion one finds actual alteration or "mistakes" in anatomy in a painting. Probably the most famous is the painting by Rembrandt "*The Anatomy Lesson of Dr Tulp*". This depicts a group of doctors, one or two with eyes turned to the viewer

rather than concentrating on the dissection by the teacher, Dr. Tulp. He is holding up a muscle of the forearm which it has been pointed out is shown to be attached to the wrong side of the elbow. There are several scholarly publications on this fact. I believe Rembrandt knew quite well where the muscle was attached but simply made the alteration perfectly legitimately in the interest of the composition.

Besides distortion, abstraction or alteration, less usual is the unexpected definition of a normal structure. The rule is that contraction of muscles emphasises tension. Choulant reports that in the classical sculpture by Polykleitus of a nude warrior in violent contest shows a swelling in the groin very much like a hernia. It was discovered by examination of athletes and by dissection that this was a normal well-developed muscle *(M. pectineus)* that is not visible in repose. Modern sculptors had not noticed it. What should be more obvious is in Rodin's *Walking Man*. The left thigh is more than 12 centimetres shorter than the right. Nobody notices what seems an obvious abnormality. The same happens in painting but less often. In an Ingres painting of a seated woman the right arm is twice as long as the left, yet it seems normal in the total composition.

Mention of Rodin's early *Age of Bronze* always brings up the accusation of the critics that he had made a cast of the model. It seems incredible that critics could believe such a thing. Superficial examination of the work shows the absurdity of the charge. The accusers did not like Rodin or his work, which ruled out objective

reporting.

Roper, an ophthalmologist, introduced the idea that the eye defect of astigmatism influenced style in painting. Astigmatism causes either the vertical or horizontal pattern of the image on the retina to be distorted by extension. He has been rather unfairly and incorrectly reported to have attributed the genius of El Greco with his vertically elongated figures, to the painter's eye defect. One only has to examine El Greco's technique to see that astigmatism has nothing to do with the painting. Again it is distortion applied for characteristic expression. Roper himself points out that in *Burial of Count Orgaz* the figures in the foreground are normal in proportion while those above are elongated. Also, there is no astigmatic distortion in El Greco's *View of Toledo*.

Artists have always been interested in proportions of the human body. Standards of measurement are referred to as a canon. This originally meant a reed marked off in equal lengths. Hersey describes many examples of the canon in art and traces the wide ramifications of the concept. (The author has been the subject of an unfortunate printer's error in his discussion). The most influential system of body proportions is credited to Polykleitus from the 5th century BC. For example, the arm should be three times the hand length, head height should be one eighth the body height, foot length one sixth, and so on. Today a frequently seen example of the canon in anatomy is one by Leonardo. This shows that by positioning the limbs in a specific way the body fits into a circle. By a small alteration in limb position it can be

made to fit a square. The preoccupation with various systems ultimately got out of hand. Not much practical value can come of studies on the relation between body proportions and the ratio of musical intervals, or that the stars governed variations. Durer wasted much time in refinements of measurements, writing four books on the subject. The idea has not disappeared though it is difficult to see what advantage it has. The artist simply arranges anatomy to produce the effect of tension, movement or balance required for the composition.

A completely new phenomenon in the history of art suddenly appeared in the second quarter of the 20th century. This is totalitarian art. An important book by Lehmann-Haupt *Art Under Dictatorship* is not out-of-date with the demise of dictatorship in Europe. Totalitarian aesthetics are based on non-artistic concepts, that is, on political ones. Naturally this leads to paralysis of creativity. Though totalitarianism may have ended in the democratic west, those who follow the principle can be observed at work. Governments do not usually attempt to suppress artists' work but there are individuals and groups who would like to do so.

Picasso is often singled out for denigration though less so in the past decades as his prices have escalated. Picasso, the greatest artist of the 20th century, is well known for his distortion of anatomy in the interest of expression. His pervasive influence on other artists is unique. In spite of his abrupt changes in style and in treatment of human anatomy, every work can be instantly recognised as by his hand. Every artist has his individual

stamp but, unlike Picasso, without the power to influence the style of others. Examination of many of Picasso's paintings shows a meticulous technique. No random throwing tins of paint at a canvas and riding a bicycle over it to produce a masterpiece in the style of one modern master. Picasso's treatment of the human figure shows changes according to period. *Guernica*, which everyone worldwide has seen, at least in reproduction, is the extreme of expression without the extreme of distortion or abstraction. Everyone can read this picture directly – it does not need to be explained. With Picasso the canon is irrelevant.

Michelangelo developed sculpture from the Greek model in his own characteristic style based on his knowledge of anatomy. Examples of incomplete works show how these followed geometric principles as the extraordinary powerful figure emerges from the block. In incomplete sculptures from ancient Greece described by Richter we can follow the principles used by these artists.

Greek art was based on the Egyptian already established 3,000 years BC. According to Michaelowski, the Egyptian canon is related to the ideology of the society. For the ancient Egyptians this was essentially stability. The body is shown complete in dual perspective. Picasso used this in a new way and in his work there are many examples. One of these is a striking drawing of a woman on the beach which shows a strange blending of dual perspective and which is, at the same time, unusually realistic. The Egyptian characteristic model is to show the head in profile, always turned to the right.

Shoulders and chest are frontal, abdomen, leg and feet (both right) in profile. This strict canon is not universal: naturalistic images are not uncommon. The differences in style are related to differences in the rank of the subject. The ruling classes are always depicted in a strict formal manner, lower orders are more free and naturalistic. Many sculptures are in limestone or sandstone, which are not difficult to carve, even with the copper tools that were used. But the Egyptian sculptor shows an astonishing skill and virtuosity in tackling not only granite, the most difficult material, but also another challenging material – obsidian. This is a volcanic glass that cannot be carved. It has to be shaped by pick, and then finished by laborious abrasion. Only the Chinese artist working in jade can surpass the ancient Egyptian in the skill needed for this technically most difficult art.

Contemporary with ancient Egypt the combination of the human figure and utensil of practical use can be seen in ancient Mexican ceramic art. Development can be followed over the centuries. The older the object the more abstract is the combination.

Certain individuals in all societies have not only got a highly developed aesthetic sense but also the essential special facility to control the process of creation and make recalcitrant material conform to the idea. This is far from a common talent and overrides anatomical knowledge however detailed.

It is notable that many of the artists mentioned are long lived. Picasso who for decades was afraid of death

lived to 92. I believe this was due not only to his physical activity but the continuous mental activity needed for his creations. He would have lived eight years longer if he hadn't smoked. Balthus is another example of a painter very active up to his death at 92. Of course, many artists' lives are short. Drugs, alcohol, tobacco and to say nothing of dreadful diets and nasty diseases are not conducive to long life.

CHAPTER 10

THE MYSTERY OF PHOTOGRAPHY

I had my photograph taken on my first birthday. Today photographs are taken when the subject is ten seconds old, or less. My parents did not own a camera and had no interest in photography. A professional photographer was therefore called in on special occasions. For this memorable operation I was placed outdoors on a garden seat, which was covered by a rug. My recollection is that someone was concealed behind the rug for some mysterious purpose. Probably in case I should fall off.

From time to time, over the years, the service of this photographer was called on. Once, when I was 8 we had a dispute, as I wanted my pet retriever included in the composition. No objection to this. The objection was the inclusion for the occasion of a motorcar incompetently built from random bits of wood. This vehicle had a unique property for its time in that it was without wheels. The body was built on a sled with metal runners and therefore depended for locomotion on the presence of snow, in spite of the fact that this commodity was only available for a few hours every four or five years. The disputed contraption was far from an aesthetic object and the photographer wanted it excluded. I prevailed and the result shows my pet in the driving position (no seat) wearing a hat, tinted spectacles and a puzzled expression.

Today the population of Western Europe and the U.S.

must possess several hundred million cameras. Neither the cameras nor photography is understood by 95% of these owners. Manufacturers correctly assume that the owners of even expensive cameras have absolutely no interest in the camera itself, but only wish to get pictures under all conditions – poor light, movement, milling crowds, restricted approach and all adverse factors met with when walking around in a strange environment. Most modern cameras are marvels of sophistication and relieve the photographer of all thought. They are electronically controlled, arrange everything, and tell the operator when to press the button.

Relatively few mechanical cameras that can be used without a battery are available today, and these are of top quality and expensive. They never malfunction. Most are largely hand built from components made in the factory, down to the last screw according to one maker (Linhof). But most cameras today are fabricated and assembled on automated factory lines. They are largely untouched by hand.

Professional photographers have the same lack of interest in their cameras as the average owner. Results are what count not tools. Press photographers are not always the owners of the very expensive cameras swung carelessly around their necks, usually in bunches of four or five. Some years ago I saw some of these cameras with a variety of dents, scratches and cracks packaged for return to the manufacturers for repair. Today the most conspicuous feature of press cameras is the large

telephoto lens to which the camera is attached as an appendage. These lenses are fearfully expensive.

My first camera was a 1935 basic Leica bought to record experiences in travel as ship's surgeon. This scientific instrument stimulated both an interest in photography and in the camera itself. More than one history has been published on the origin and development of this camera. For portrait and fashion photography it has been largely supplanted by an equal quality larger format Hasselblad. But the Leica still retains its status in the serious amateur field. If any owner of a good camera wishes to know something of the inside of these and how they work, N. Goldberg's book gives the information. However, even with this knowledge any attempt to dismantle is not advised. I recall a technician in one department taking a modern reflex camera to bits to find out how it worked. He discovered that there were more bits than bargained for and the camera had to be returned to the makers for re-assembly.

Being inexperienced I used the Leica in typical tourist fashion. Buildings and city streets were the main subjects. It was difficult to make the Panama Canal interesting and I did not succeed. The dozen or so inhabitants of Pitcairn Island who came aboard simply lined up and smiled at the camera, much like a group at a picnic.

Professional news photographers like action from their subjects, especially groups. Halsman in taking portrait photographs persuaded many of his subjects,

including the Duke and Duchess of Windsor, to jump six inches off the floor. If only I had thought to get the Pitcairners to do this.

Cartier Bresson refers to the "decisive moment". This is hard to achieve and needs a combination of close observation, anticipation, and speed. In fact many, though not all, decisive moments are the result of a lot of planning, sometimes over several days. For the amateur it is not worth the effort.

A message of some kind is usually present in the photograph, and has been from the beginning. The extraordinary phenomenon of a chemical image given a profound significance and absorbed into consciousness as reflecting something real deserves more research. The obvious example is the sizeable segment of the population who regard T.V. characters in an imaginary family as real. In fact these images, which are primarily photographic, are doubly removed from the real. A synthetic assembly of characters of wholly imaginary individuals can be magically transformed into real people. Deep emotion is aroused by the ups and downs of these images' so-called lives. An early example in the history of photography from the 20s is movie actor Rudolph Valentino whose sudden untimely death (from a mishandled acute appendicitis with perforation) led to extraordinary scenes of mass grief. Millions were stricken. The effect of his sudden demise did not fade for decades. It may be said that after all Valentino was a real person. But the persistent emotions stirred up by a

fictional life have nothing to do with the real person. In fact Valentino's screen image differed substantially from his real character. Seen only through photography admired individuals often turn out to be quite different in real life.

If we go back to the beginning of photography and the early photographic technology of the Daguerrotype we find records of the reaction to the new discovery. C. Danthendey (cited by Crawford) became a professional photographer more than 150 years ago in 1843, four years after the introduction of a metal plate print in 1839. Danthenday describes the response to these as "verging on paranoia. People were afraid at first to look for any length of time at the pictures produced. They were embarrassed by the clarity of these figures and believed that the little, tiny faces of the people in the pictures could see out at them". The significance of viewer reaction was appreciated early and swiftly taken up by those who wish to control ideas and opinions.

With the 35mm camera it is possible to extend the use from the everyday into new worlds, from the close-up to the magnified image. Not much additional equipment is needed beyond two or three specialised lenses. Few amateurs make use of these. They are rather expensive. Beyond the magnified images produced by these special lenses is the microscope used by the professional. Expertise here is no longer required as it once was. The instrument measures everything and as usual awaits the finger on the button.

Photomicrography is required to illustrate many publications in medicine and biology. Fifty years ago I acquired expertise in the technique. Today special departments with large staffs of specialist technicians are used for all kinds of recording. These photographic techniques need special preparation of the material to be photographed that makes them difficult for the amateur.

Everyone has seen the stunning images of insects captured by the patience and skill of specialists in motion picture photography. One important factor in this insect photography with the production of crystal clear images with great depth of field is the use of tropical specimens, which are very much larger than the kind one finds in the gardens anywhere in Europe. They may measure 5cms or more. What can be done with the lens is limited by optical theory, but these professionals by clever use of ancillary methods can enhance the effects.

I made little use of this kind of photography called photomacrography until I noticed a paper by Witt published on the effects of drugs on web building spiders. To devise a method to deliver exact quantities and take samples was not too difficult even if the common *Ziegella-x-Notata* is rather small like many web builders in Northern climates. Fig 2 shows the photomacrograph of such a subject. Fig 3 is also a photomacrograph but this differs by manipulation of the image by a combination of negative and positive film. It illustrates a 2 cm stamp seal from ancient Persia. The intaglio loses all detail in the direct photomacrograph. The method is

Fig.2 A spider undergoing an operation, photographed by the author. Afterwards she walked away. Cover of the journal *Science* 3rd March 1961.

Fig. 3 Ancient Persian stamp seal showing details of intaglio, photographed by the author. Cover of the journal *Science*, 21st May 1965.

an example of squeezing more information from an unpromising subject. A related method (unsharp mask) to reveal stars invisible by conventional methods has been used in astronomy by Mudin, with great success.

Roland Barthes, one of France's leading intellectuals published a book on photography in 1970. This short work has many perceptive things to say on photography. For example one can look at collections of professional photographs and simply accept them as they are, as a scene, simple or complex. But in certain examples when one pays close attention, inconsistencies or something inexplicable emerges. Barthes gives examples of this strange phenomenon. As a result he changes the way one looks at certain photographs.

Susan Sontag's book was published in 1973 and is unusual for a book on photography in lacking photographs. She says that some photographers with no scientific background consider themselves scientists and gives the well-known German photographer August Sander as an example. He compiled an extensive catalogue of the German people according to trade, class or profession. After years of effort it was published in 1929, but five years later the Nazis seized all copies and destroyed the printing blocks. It was thought that the book would make judgement of the quality of the people superfluous. Sanders' efforts were obviously without scientific value and are reminiscent of turn of the century attempts to correlate physical appearance with abnormal psychology and criminal behaviour.

Sontag's book ranges over theories of photography and she discusses the work of Diane Arbus, which is unique. Her photographs appeared occasionally years ago in photo magazines. They were unlike anything published before. Many depict the congenitally malformed, now classified as the disadvantaged. They did not consider themselves to be outside normal society, and were happy to pose for the photographers whom they did not think intrusive. There is one photograph that shows the parents and their exceptionally large son. His problem can be diagnosed as a disorder of the pituitary gland (acromegaly) associated with gigantism. But he is not as gigantic as he seems. The group pose staring at one another across a living room. This image is certainly manipulated. Such pictures are often found in psychology textbooks that deal with visual perception. The composition creates an illusion by arranging perspective in a specially built room. The eye is deceived when the three dimensional scene is transformed into two dimensions by the photographic print. This process can greatly exaggerate the size difference between objects at each side of the picture, and adds to the impact.

Ever since photography was invented there has been a debate as to whether it is an art or a craft. Individuality in style is exceptionally hard to achieve in photography. Style is natural to the painter and can be compared to handwriting, the painting itself is a signature, easy to recognise except in some abstract works where the result is simply by chance. Photography relates to a mechanical process that translates the image produced by the lens on to prepared paper when it is then chemically fixed. It is

an exact two-dimensional copy of the three dimensional subject. The print can be changed in the printing process in various ways. But again this is essentially mechanical. K. E. Wade describes many ways of changing the original print. When a variety of colours are applied the print begins to look like a painting and might be classified as art.

The question of the art craft division of photography seemed to be settled in 1862 with involvement of the law. It was decided in the courts that photography was not art. The Appeal Court reversed this decision. Then this decision in turn was reversed. So today, as far as the law is concerned, photography is a craft. Professional photographers are always annoyed by this view, though it is hard to see why. Is a cake basket by Paul de Lamarie in the Ashmolean Museum a work of art, or craft?

Many owners of a camera could transform their results and raise their skill in communication by reading just one book. One subject which most people have heard of and which can enlighten the field of photographic communication is *semiotics.* Superficially simple, semiotics seems to become more complex the more one reads about it. It is the study of signs. Semiotics is not as recent as it seems. As usual the Greeks were there first. Semiotics is assumed to date from the beginning of the 20th century. But it can be traced back to the Stoic philosopher Crysippus about 300BC. It is obvious that semiotics has a bearing on image making. For those who would like to see how semiotics impinges on photography F. Webster has a more extended discussion

in a book specifically directed at photographers.

Shallow depth of field at high magnifications is a disadvantage when photomacrographic lenses are used to photograph small objects. It reduces the sharpness of the image to a range that may be 0.5mm or less. Anything outside this range appears progressively unfocused or blurred. In ordinary photography restriction in depth of field is usually not noticed and is easily controlled. Reducing the aperture of the lens diaphragm in a standard 5cm lens can give a noticeable increase in sharpness. But if this is carried too far the emergence of diffraction degrades the image, so we are back where we started. To increase depth of field from 0.5mm to 5mm in a photomacrographic lens is ruled out by the physics of lenses. Because of this attempts to avoid the problem are not even considered. This may be a mistake. In still photography there might be means to circumvent the restriction.

This short discussion on the strange subject of photography is mainly directed at those who have only a mild interest in the subject. They might be encouraged to improve their understanding and skill by reading just one or two books, for example those of Aaron Sharf. Study, inventiveness and practical work in this field of photography will I think improve longevity as much as any other work which requires similar study and practice over many years.

The range of skill and knowledge of cameras among the two or three million serious amateur photographers is

impressive. But there is nothing in which knowledge cannot be widened by study.

In spite of the total penetration into every aspect of society photography is still as mysterious in its psychological aspects as it was in the beginning when “little, tiny faces” frozen in time peered out at the viewers to remind them of their mortality.

CHAPTER 11

ESSENTIAL OUTLINE OF THE NERVOUS SYSTEM PURGED OF JARGON

One major difference between nerve cells and all other cells of the body is their great variety in size and shape of both the main mass and the extensions peculiar to these cells. Each cell distributes from one to several thousand fine branches. These threads individually invisible to the naked eye when collected together appear as pinkish white cords of varying sizes from a fraction of a millimetre to a flat one-centimetre band. Those fibres which pass from the brain directly outside the skull to the various parts of the body to control movement can be *75* centimetres or more long. Every cell in the body except a few with rapid turnover is in reciprocal relation with the brain. Everything that happens in the periphery is signalled to the centre and the centre responds. Most actions and reactions do not reach consciousness.

Theoretical physicists are fond of thought experiments. A thought experiment can illustrate the basic simple function of these nerves.

Just suppose that the optic nerve from the eye carrying images of the outside world to the brain were to be transplanted to the auditory nerve, and the corresponding auditory nerve was transplanted to the eye. What would happen? In a thunderstorm the subject would *see* the thunder and *hear* the lightening. The basis

of this phenomenon is simply that signals or nerve impulses in both these nerves are exactly the same. This nerve impulse is not primarily electrical, but a molecular change which sweeps along the nerve fibre. It is accompanied by changes in electrical potential that can be displayed on a fluorescent screen for analysis.

The number of impulses that can be carried by the fibre in a given time is limited due to the necessity for the fibre to return to balance after the passage of each impulse. Passage along the fibre is quite slow, and far from the speed of an electrical impulse. It ranges from a few metres to a maximum of under one hundred metres per second. The difference is simply accounted for by the distance separating the end point and the brain – the greater the distance, the faster the speed. This takes care of co-ordination between near and distant points. The energy consumption by the cell is very low, and is accompanied by heat as a product of the chemical changes, a universal phenomenon in living processes. Heat production is extremely low. However, the total energy used by the brain as reflected in heat production is much larger than might be expected from an organ of its size. In spite of the slow speed of transmission, because distances inside the brain between connected points is small, at most a few centimetres, contact here occurs in less than a millisecond.

Increase in muscle effort and variation in intensity of sensation is controlled by using more fibres and increasing frequency of impulse. Sensation of touch, temperature or pain is determined centrally from special

endings in the skin. The eye and ear have more complex receptors. The brain therefore only maintains contact with the outside world by means of a stream of identical impulses. In contrast, inside the brain this fundamentally simple transmission system serves an organ of unsurpassed complexity. Every signal passed to nerve cells is accompanied by specific chemical changes with stimulation or inhibition largely outside conscious perception. As well as direct fibre connections chemicals are produced to influence distant structures. Feedback is a characteristic of all activity. These facts show that the basis of function of the brain is completely different from that of the computer.

Looked at from the outside, the brain is a rather simple object. Today it is familiar to nearly everybody. It consists of two hemispheres joined in the midline. The surface layer is folded and compacted into the skull cavity. Below these large hemispheres is a pair of smaller more regular folded hemispheres. These automatically control all details of body movement, especially in the complex function of balance, and relieve the large hemispheres of constant attention and control. However, if one of these minor hemispheres is deleted by a congenital ablation, the major hemispheres can take control so effectively that all symptoms and signs are absent.

Inside the major hemispheres there are a small number of globular masses of cells, and below in the midline, a stalk or stem about three fingers in volume, also contains smaller masses of cells. This stem tapers

and continues out of the skull as a cord about one centimetre diameter which passes down inside and is protected by the bony spinal column. This is the pathway for communication and control of body movement and the reception of sensations.

Penfield, the Canadian neurosurgeon, at operations on the brain, made use of insensitivity of the surface to define localisation of function. Some responses can be complex. For example, in results reported decades ago stimulation of one area the patient displayed an unexpected complex phenomenon. She reported that she saw a man dressed in a lumber-jacket which was dusted with snow, come into the operating theatre. She expressed surprise that he should be allowed to do so. When the stimulus was stopped the apparition disappeared. If the stimulus was continued the patient became increasingly anxious.

Observations on localisation of function on the brain's surface were first obtained in the early part of the 19th century by Broca, a French physician who as the result of pathology in a patient defined the well-known speech centre, afterwards called Broca's area. Experimental observations on the human brain surface began in 1870 in Germany. Large areas seemed not to respond to direct stimulation but nevertheless practically all have now been mapped and all perform essential functions.

The side of the brain located from the outside just above the ear is called the temporal lobe. A disorder here

produces unpredictable and extraordinary results. In 1979 D. Bear reviewed the complex manifestations of temporal lobe disorders. There are differences between the right and left sides. Emotional outbursts are initiated on the right, and responses to everyday events are inappropriate.

On the left the characteristics are a sense of personal destiny moral self-scrutiny and pre-occupation with questions of philosophy with an increased interest in religion up to religious conversion. I do not know of any research on the evolutionary significance that these findings must have. Some researcher out there should look into it. Another curious feature is the lack of a sense of humour in these people's complex thought processes.

Other areas besides Broca's are involved in speech. Hearing is linked to Broca's area. Emotion is involved. As anyone can see, in excited speech movements of hands, arms and shoulders play an expressive part. Significantly these motor areas are close to Broca's area. Speech produced modern man some 50,000 years ago yet speech as might be expected did not make the brain larger than it was more than 100,000 years ago. The question here is: has evolution of the brain ceased?

To review the capabilities of the central masses of cells comparative anatomy has something to say. There are animals where these central masses are well developed and the surface or cortex is reduced to a thin insignificant layer. This large relative development of the central masses is what we find in birds. Therefore these

central cells must control the well-known complex behaviour of birds. Grey parrots can be taught to count, recognise colour, shape and reply to questions. In mammals generally the surface layer is well developed. Man has much the largest relative development where it forms the most conspicuous component seen in the folded hemispheres. The ancient brain inherited from primitive reptiles buried inside the hemispheres still retains important functions in memory, emotion and in relay, storage and automatic control of repetitive functions.

Where do nerve cells come from? Embryology shows that they are simply transformed cells of the skin, that is, those cells that are in direct contact with the outside environment. Their special quality is merely that they develop sensitivity or excitability to a stimulus far beyond that of the sensitivity possessed by any other body cell. The basic properties of the nerve cell can be shown in primitive animals.

Many years ago Yerkes showed that even a worm could both learn and remember. An earthworm was introduced into the stem of a glass Y-tube. One limb of the tube has an electrode that gives the worm a shock if it turns left instead of right. It soon learned to turn right. More recently additional information has been elicited by studies on the sea snail which is large and easy to operate on. Here not only learning and memory but also habituation and inhibition association or response to indirect stimuli can take place. These properties are the basic elements of all nerve cells in every animal. Their

sensitivity reaches an astonishing degree in specialised sensory cells. In perfect conditions a 100-watt sound source could be heard at a distance of 3,000 km. This is said to be the equivalent of movement of the eardrum by the diameter of the hydrogen atom.

The sense of smell in man is often assumed to be weak. On the contrary, olfaction is an extremely complex sense and one that carries many subtle unconscious signals. As one might expect in principle all sensory cells function to the limit of basic physics. In man smell can out perform the tracker dog for certain odours. The dog has advantages in having a much larger area for smell reception.

Visual cells respond to one photon of energy, the smallest unit of physical energy. Perception requires two or three photons. This is equivalent to being able to see a lighted candle at night at a distance of 3 km.

The eye is always taken as an example both for and against evolution. The puzzle of the appearance of the eye in evolution is a pseudo-problem. These sensitive nerve cells surrounding support structures and the lens to focus the image have led to the confident statement that the eye could not possibly have arisen by chance. It is said that the eye obviously must have been designed for the purpose of vision. As proof mathematical ("scientific") calculations are made to show trillions to one against chance, in other words, virtually equivalent to proof.

But theoretical scientists are not always right. The philosopher Nietzsche already in 1881 had observations to make on chance and the origin of the eye. He says that the impartial investigator who studies the history of the eye and its step-by-step evolution must arrive at one conclusion: vision was not the intention behind the creation of the eye, but vision appeared by chance. A single instance of a biological change to adapt to change in the environment means that purpose in *all* biological change is negated.

The basic unit for vision is a nerve cell and like all nerve cells of the brain, these arise from the skin surface of the embryo. Mere sensitivity in a patch of surface cells to light and shadow gives an advantage in competition for survival. Changes took place quickly, and even followed different routes to the same end. In the vertebrate eye the sensory cells point inwards, away from the incoming stimuli. This makes for complications in the structure of the retina but has advantages. In spiders the sensory cells point outwards with advantage for the spider. Being essentially nerve cells a certain amount of preliminary processing takes place in the retina.

The above introductory lecture given to medical students ended at this point. The basic information can be developed. For example, in the interesting problem of mind or consciousness: mind evolves with the evolving structure of the brain. This emergent evolution is where a new property appears with increased structural complexity. It is less mysterious than the strange phenomenon in today's atomic physics where there is

proof that one subatomic particle can be in two different places at the same time.

The massive detail on structure and function of the brain, which no individual could master, gives few clues to the phenomenon of consciousness, nor do these details have much to say in meaningful explanation of the structural basis of psychological functions. It may be that the gap is unbridgeable.

Do animals possess consciousness? Nearly all biological scientists dismiss the idea of animal consciousness out of hand. It is classed as anthropomorphic and non-scientific. There is no doubt that much animal behaviour is not conscious as we have seen in the widespread control of behaviour by the central nuclei in the brain. But perhaps all mammals are not automata. An award winning scientist of international repute, Donald R. Griffin discusses the apparently insoluble problem and comes down on the side of animal consciousness. I am inclined to agree. Though anecdotes however numerous are not acceptable science, the overwhelming number and variety of these point to some kind of consciousness in animals.

CHAPTER 12

A RECOMMENDED LONG TERM PUNITIVE EXERCISE FOR THE BRAIN

Why on earth would any European immersed in a profession for years with no relation whatever to anything Chinese, suddenly expend time and energy on the study of a written language stated by experts to be "the most intensely difficult of all writing systems"? The sudden stimulus was a book, strangely, not on the language, but on Chinese art. In particular an illustration of a colour glazed pottery figure of about 100BC rendered in an expressionistic style, of an official of the period. It had striking elements of some 20th century art.

This started a train of thought that led to the examination of paintings with a few characters arranged in vertical lines beside a figure in a landscape. I did not realise that this painting demonstrated the special character of Chinese painting. The picture combines three arts in one. They are called the three perfections. A painted landscape, a poem with Chinese characters each character a painted art form. In no other language can this combination take place. I examined other examples of Chinese texts and felt completely baffled as to how they could convey abstract meaning. Each complicated character is a separate unit and all are of the same size and each is constructed within a square. Learning to read them is a difficult and time consuming task and the cause of much illiteracy in China.

Poems on paintings are often beyond the powers of even educated Chinese to decipher. Museums wishing to have a poem translated still sometimes require the service of a specialist to read them. To ease the difficulty in ordinary everyday communication the Chinese Government introduced Romanisation. This at least was useful for the typewriter. A Chinese typewriter was something to behold.

When one is accustomed to the classical characters Romanised print looks a mechanical conglomeration of x's and z's compared to the little artworks of every character painted or printed. Roman print in any language has little aesthetic content. At the same time because of the complexity of many characters the Chinese government decided to simplify many of them. This reduced them to a kind of shorthand. International Sinologists were horrified at the interference as well as upset by the requirement to learn the three or four thousand new characters. In fact this is not too difficult.

The earliest examples of the Chinese language go back to the Neolithic. It is the only pure language in contrast to English, which is derived from ten other languages. Though I do not discuss the spoken language here, there is one characteristic of the spoken language that is worth remarking on. This is something common to all languages but is especially highly developed in Chinese. This is homophony where though spelling and meaning are different the pronunciation is the same. Chinese carries homophony to extremes. The common sound "*chi*" has two hundred different characters all with

different meanings. Homophony can often lead to misunderstanding where foreigners are concerned.

Some examples of these misunderstandings were given by Smith in 1902. A group of Chinese heard some foreigners singing an English song in which the chorus ran: "Tomorrow will you go?" This sounded very strange to the Chinese listeners. In the Wade Romanisation the Chinese characters *pronounced* (the reader can try it) *"T'ou mao jou wei liao kou"* but read: "stealing the cat's meat to feed the dog".

Another example of homophony causing confusion occurred at the time of the march of British and French forces on Peking, or Beijing as it is now called, in 1860. The soldiers knew that the distinguished leader of the Chinese army was called San Ko Lin Sin, and they thought that he must be an Irish soldier who had deserted from the British ranks and whose name was Sam Collinson.

Smith also cites examples of tactics that can be used to avoid social contretemps. One of these is: "Do not invite a guest of 70 years to stay the night; do not invite a guest of 80 years to sit down". Elderly guests on a visit have been known to expire. It is not particularly rare.

Up to the earlier part of this century the literary scholar trained in the traditional way would have no difficulty in recalling from memory any passage from the voluminous classical literature, no small feat. Ichisada Miyazaki details the punishing system that leads to this

ability for recall required for entry to government service. The system began in China around 600BC and continued with modifications over the centuries.

The theme for one essay gives the flavour of the tests, more elegantly expressed in classical Chinese than literal English: “One man, two men; by intention, without intention” was elaborated: “Those who are virtuous by intention, through virtuous, shall not be rewarded. Those who are wicked without intention, though wicked shall not receive punishment.” A substantial answer in good literary style with liberal quotation was required to satisfy the examiners.

Smith remarks that the extraordinary verbal memories of the Chinese sometimes failed. A man was enthusiastically praising a couplet he had just seen. On enquiry as to what the couplet was, he replied, “I have forgotten the first line, but the second was something, something, something – Spring!”

To show how a character conveys meaning all I would need was a short elementary book on the language. Any European language, except perhaps Czech or Hungarian which are more difficult for most other Europeans, requires about nine months of motivated study to be able to carry on a fluent conversation. Reading literature needs more time, but I decided it was worth a few months’ study just to see how the characters worked.

There are a lot of books in Chinese and Japanese

with “elementary” or “introduction” in the title, which suggest quick results. For instance who could resist “*Japanese in a Hurry*” I am afraid these languages cannot be absorbed as fast as one would like. One book by Chan has 1,200 characters and the approach is by the dissection of each character stroke by stroke in correct order and building familiarity with them by writing in a variety of contexts. This is learning by writing in contrast to today’s conversation first before reading method of language learning.

Because of time restrictions it took about a year to finish the first elementary text. Then I found that 1200 characters, which I had painstakingly committed to memory, fell far short of what was required to read even a newspaper. Of course my original problem on the transmission of complex abstract ideas by the use of these artistic strokes simply melted away.

Then I came across a text, which was written to expand vocabulary for the Chinese student, edited by F. N. Paar with translations in four languages. This classic dates from the early 6th century. It is an amazing work. Each of the thousand characters is used only once. Four characters are grouped in each line and comment on a wide variety of subjects. Naturally there are legends surrounding the composition. One of several described by Paar is that the Emperor of the time had his high officials each write an essay. He then ordered them to select 1,000 different characters from these essays. One official was then ordered to write a composition using all and only these thousand characters without repeating any

of them. He completed the task in one night so we are told.

Each character in this classic has two or three up to five, ten or more meanings, and was drilled into the memory by re-reading. It took quite a long time to discover that one character was repeated. I wonder if this was deliberate? I have to admit that there were a few characters I did not think I would need often. One means "a pearl which is not quite globular". I was surprised to find that there is an English word for this. Another means "a gear in a jade astronomical instrument". Needham remarked in one of his books that a character he was not likely to use very often meant "the sound of the peasants singing when returning from work in the fields".

There is a great difference between the printed classical literary style and the spoken language. Conciseness is the characteristic of classical writing. Copious elaboration has to be introduced to make a passage understandable to a listener. This means that two or three times the number of characters have to be used to convey meaning.

Chinese poetry especially illustrates this brevity and compactness. Shades of meaning are expressed in a few characters. English translation needs considerable expansion to capture meaning. One random sample shows that 30 characters needed at least 90 English words for translation.

In old China when the student was familiar with a

basic number of characters one short book in 838AD became a standard text for language study in schools up to 1912. It was called the *Classic of Filial Piety.* Even with knowledge of a thousand or so characters the first meeting with the elementary classical primer revealed that it was completely incomprehensible. By chance, years ago, I picked up the primer which was Volume I of a three volume set on classical Chinese in the University library and it was at once obvious that it had been subject to prolonged study. Probably the reader had been beguiled by the brevity. It is not a book to begin study of Chinese. Volume 2 and 3 seemed not to have been opened. The University at that time did not have a Chinese department so advice on how to learn the classical language was lacking. Traditionally a teacher is believed to be essential. In fact with enough determination a teacher can be dispensed with. Classical Chinese is not a spoken language.

There are several useful books for vocabulary building. Among them is one on newspaper Chinese with excerpts from newspapers, mainly from the 30s. Reports of air attacks, suicides, thefts, typhoons and political upheavals mesh seamlessly with the world news of today.

A sad tale is told in another elementary text intended for students of Cantonese. In printed form the difference between Cantonese and standard Mandarin is minimal. The passage describes how a visitor from the country goes into a city shop which sells fabric, some of which he wants to buy. But his dialect is incomprehensible to the shopkeeper. To break the impasse the shopkeeper offers

the customer a writing brush and invites him to write down his requirements. The customer declines – he cannot write, and leaves, head down, ashamed of his ignorance. This means that anyone who can write can communicate, whatever his dialect, a demonstration of the unifying power of the written language.

Contemporary records of events in history are always of special interest. One exotic account of travels in early China, which is not often mentioned in the literature on China, is that of a Japanese Buddhist monk, Ennin. He spent nearly ten years from 838AD in a winding trail around China, much of it on foot, to the capital at that time, Chang' an. He was in search of the Buddhist law. As it happened, for a monk it was not a good time for travel. The Emperor had become exasperated by the vast expansion in the number of monks who took up religion in preference to productive work in the fields. He turned them out of the monasteries, imposed forced labour and destroyed most of the temples. Unfortunately many bronze figures of Buddha shared in the destruction when they were melted down for coinage. They might be said to be worth their weight in gold. This is why there are few bronzes of this early period to be found today. This hostile climate to Buddhism made difficulties for Ennin but his personality allowed him to avoid the worst.

The question often arises about the number of characters needed for a useful vocabulary. The estimates differ. An estimate of the number of English words used by the average person according to S. Pinker is 60,000.

Estimates are complicated by the ability to guess meanings and fill gaps. A standard Chinese dictionary has about 80,000 characters. At least half of these are never used, being recorded variants from the past, or even just invented by the compiler. Of the rest, about 10,000 at most might be recognised by a specialist. One distinguished expert stated that he found to his surprise that 6,000 were the limit of his knowledge. If this number seems modest it must be remembered that nearly all have several different meanings. This gives a large expansion in vocabulary.

Linguist Rudolph Fleisch made the astonishing statement that the Chinese language was simple. It depends on what he meant by simple. He had not studied the language and his misconception may have arisen quite reasonably because he had read descriptions of the language where he found that in Chinese there are no inflections, gender, case, tense, degree of comparison, prefix, or suffix, or punctuation (in the older literature). Depending on the context one character may function as verb, adverb, or noun.

This mobility of characters can be demonstrated especially well in poetry. A poem can be composed in such a way that the characters can be read backwards to make a new poem – completely impossible in any other language. The Lady Su Huei in ancient China composed a series of poems, which were woven in silk and sent to her husband in command of troops guarding the frontier. In a matrix of 64 characters they could be read in different directions to make different poems. Four

transformations of one poem can be generated according to the direction they are read – forwards, backwards in a circle or diagonally. As Herdan remarks this requires a sovereign command of the language.

Another strange feature of this extraordinary language has to do with the number of strokes used in constructing the character. Stroke number goes up to 36. Three, five and eight strokes are the most frequent. These correspond with the successive numbers of the Fabinacci series where each number in a series of numbers is the sum of the two proceeding ones. Each number also divides the distance between its neighbours according to the Golden Rule.

In a text one puzzle for the beginner is a sudden interjection of usually three characters that seem to have nothing to do with the subject. These are the names of individuals. Only sometimes does a line in the margin indicate the name. Some apparently straightforward passages involving names of individuals can lead to serious mistranslation, even by experts. When three or four characters fit into the sentence as part of the meaning the reader can be led completely astray.

Translating poetry in any language is not easy. Roman Jacobson says that the pun (paronomasia) reigns over poetry and therefore poetry by definition is untranslatable. Free translations are sometimes very free. Arthur Waley was famous for his translation of Chinese poetry. For guidance in translation for students of the language Waley is not helpful. As a creative artist Waley

merely took a hint from the subject and then more or less composed his own poem. Ezra Pound is worse as a guide. Pound looked at the characters and made his own interpretation simply on appearance and dashed off a poem. What a character looks like rarely has anything to do with meaning. For the study of poetry there are many collections. One is from the great age of Chinese poetry the T'ang by China's greatest poet of the 8th century, Tu Fu, (translated by David Hawkes).

In the early 80s at a Chinese commercial exhibition of modern ceramic and craft goods I asked some of the staff if they knew any of the poems of Tu Fu. They had never heard of him. They looked at me as if I was a secret policeman. I learned afterwards that the government of the time had banned Tu Fu as subversive. As I remarked elsewhere, dictatorships politicise all forms of art, but it was a surprise to find thousand year old poetry coming under interdiction.

A Chinese book starts at what we in the West would call the back and reads backwards to the front. This has a logical explanation and derives from the period when the characters were written in a column on bamboo slips. The slips were tied together through a hole at one end, and when one column was read the slip was swung aside. This arrangement was translated directly to the pages of a book. It follows that on each page the writing is from the top down, starting on the right side of the page. The Chinese also invented paper and with substitution of the printing blocks for the slips of bamboo the use of the brush became an art form. In the printing block each

whole page was carved as a unit. This began about 300AD. Then about 900AD each character was carved on a separate piece and set up in a frame to print a whole page. This method of moveable type was used long before its discovery in the West. Nearly all European books on printing fail to mention this.

Transmission of printing from China was originally through the Middle East rather than Central Asia, which was the original route for communication with the West since Roman times. Because it was upsetting the trade balance the Emperor Tiberius restricted the importation by this route of the large volume of expensive luxury goods, much of it silk fabrics in exchange for Roman silver. The Roman currency was being depleted. The Middle East route may account for the slow development of printing in the West. Countries in the region were inclined to be secretive. Transmission from China of paper money gave a trade advantage for a time before inflation and spread of knowledge of the system destroyed any advantage.

In the 30s a book on printing in China went to a 2nd edition and was placed on a United Nations list of fifty books considered to have contributed most to essential world knowledge. A few years after publication it disappeared from booksellers lists and nobody seems to have heard of it since. Marguel does not mention it in a book on the history of reading. This author describes the invention of printing as a Western invention.

The Chinese have always had a great respect for the

aged. They are supposed to be wiser than the rest of us. A few certainly are. But we would all like to increase the number. But how?

I propose that when general health is taken care of, the tough mental exercise needed to master the world's most difficult written language, classical Chinese, will promote longevity. My reason is that after formal education ends between 15 and 25 for the great majority; the brain is left simply to coast along. It is very rarely kept in top condition by a continuous stream of challenges to memory and comprehension. And don't forget the brain interacts with every cell in the body. We all know what disuse leads to. So take up study at 45 and live to 90 (at least).

BIBLIOGRAPHY

1. Atkins, P W, 1977. *Creation Revisited.* Oxford University Press.
2. Ash, R, Lake, B 1998. *Bizarre Books*. Pavilion Books.
3. Barthes, R 1993. *Camera Lucida*. Vintage.
4. Bear, D M 1979.in M S Gazzanigo (Ed.) *Handbook of Behavioural Neurobiology. Vol. 2* Plenum
5. Belt, E 1955. *Leonardo the Anatomist.* University Of Kansas Press.
6. Bettleheim, B 1991. *The Uses of Enchantment.* Penguin
7. Bodenheimer, F S 1951. *Insects as Human Food*. W. Junk.
8. Braithwaite, J 1984. *Corporate Crime in the Pharmaceutical Industry.* Routledge.
9. Brandt, J 1954. *Introduction to Literary Chinese*. Ungar.
10. Bristowe, W S 1958. *The World of Spiders.* Collins
11. Bristowe, W S 1932. *Transactions, Entomological Society,* London 80, II.
12. Buteyko, K, Stalmatski, A 1999. *Freedom from Asthma*. Kyle Cathie.
13. Canetti, E 1987. *Crowds and Power.* Penguin.
14. Carruthers, M, Murray, A 1976. *F/40 Fitness on 40 Minutes a Week*. Futura.
15. Chan, S W 1959. *Elementary Chinese*. Stanford University Press.
16. Coleman, V 1988. *The Health Scandal – Your Health in Crisis*. Sedgwick and Jackson.
17. Cousins, N 1981. *Anatomy of an Illness as Perceived by the Patient.* Bantam.
18. Creel, H G 1952. *Literary Chinese. Vol. I, II, III.* University Of Chicago Press

19. Davidson, J 1997. *Courtesans and Fishcakes.* HarperCollins.
20. Dawkins, R 1998. *Unweaving the Rainbow.* Penguin.
21. Farrington, B *The Preface of Andreas Vesalius to De Fabrica Corporis Humani 1543* Proceedings Of The Royal Society Of Medicine XXV 1932.
22. Goldberg, N 1992. *Camera Technology*. Academic Press.
23. Goodrich, L C 1948. *A Short History of the Chinese People*. Allen & Unwin.
24. Griffen, D R 1984. *Animal Thinking.* Harvard University Press
25. Gueniot, M 1949. *Les Trépanations Préhistorique* Médecin France.
26. Hawkes, D 1985. *Three Chinese Poets*. Oxford University Press.
27. Herdan, G 1964. *The Structuralist Approach to Chinese Grammar and Vocabulary.* Mouton, The Hague.
28. Hersey, G L 1996. *The Evolution of Allure*. Massachusetts Institute Of Technology.
29. Hodgins, E 1964. *Episode: Report on the Accident Inside my Skull*. Gollancz.
30. Hyrtl, J 1835. *Antiquitates Anatomicae Rariores.* Vindobonae.
31. Karinthy, F 1939. *A Journey Round my Skull*. Trans. V D Barker. Faber & Faber. Republished 1992 by Corvina Books Ltd., Vörösmarty tér 1, Budapest Hungary 1051.
32. Kraepelin, E 1921. *Manic-Depressive Insanity and Paranoia*. Livingstone.
33. Lantos, J D 1999. *Do We Still Need Doctors?* Routledge.
34. Lehmann-Haupt, H 1954. *Art under a Dictatorship*. Oxford University Press.
35. McKeown, T 1991. *The Origins of Human Disease.*

Blackwells.
36. Majano, G 1991. *The Healing Hand*. Harvard.
37. Marshall, B J. *see* www.helico.com
38. Miyazaki, I 1976. *China's Examination Hell*. Weatherhill.
39. Moorehouse, L E, Gross, L 1981. *Total Fitness*. Granada.
40. Nahas, G G 1979. *Keep off the Grass*. Pergamon.
41. Nietzsche, F 1881. *Morganröte*. Kröner Verlag
42. Nuland, S B 1994. *How We Die*. Chatto & Windus.
43. Paar, F W 1963. *Ch'ien Tzu Wen*. Ungar.
44. Pinker, S 1994. *The Language Instinct*. HarperCollins.
45. Rubin, V A 1976. *Individual and State in Ancient China*. Columbia University Press.
46. Sharf, A 1965. *Creative Photography*. Studio Vista.
47. Sigerist, H E 1951. *A History of Medicine*. Oxford University Press.
48. Singer, C 1925. *The Evolution of Anatomy*. Oxford University Press.
49. Smith, A H 1902. *Proverbs and Common Sayings from the Chinese*. Shanghai.
50. Snelling, H H 1849. *The History and Practice of the Art of Photography*. Morgan & Morgan.
51. Sontag, G S 1979. *On Photography*. Penguin.
52. Tannahill, R 1973. *Food in History*. Penguin.
53. Valenstein, E S. 1986. *Great and Desperate Cures*. Basic Books.
54. von Zach, H E. 1952. *Tu Fu's Gedichte*. Harvard University Press.
55. Webster, F 1980. *The New Photography*. Calder.
56. Whitaker, K P K 1958. *1200 Basic Chinese Characters*. Humphries.
57. Witt, P N 1955. *Die Wirkung einer Einmaligen Gabe von*

Largactil auf den Netzbau der Spinne Zilla-x-notata. Monatschrift f. Psychiatrie u. Neurologie.
58. Yudkin, J 1988. *Pure, White and Deadly*. Penguin.

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