

Fake!

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Thou shalt not steal, an empty feat
When it's so lucrative to cheat.—
ARTHUR HUGH CLOUGH,
The Latest Decalogue

In the year that Popeye became once again a major movie star it is salutary to recall that his claims for spinach are spurious. Popeye's superhuman strength for deeds of derring-do comes from consuming a can of the stuff. The discovery that spinach was as valuable a source of iron as red meat was made in the 1890s, and it proved a useful propaganda weapon for the meatless days of the second world war. A statue of Popeye in Crystal City, Texas, commemorates the fact that single-handedly he raised the consumption of spinach by 33%. America was "strong to finish 'cos they ate their spinach" and duly defeated the Hun. Unfortunately, the propaganda was fraudulent; German chemists reinvestigating the iron content of spinach had shown in the 1930s that the original workers had put the decimal point in the wrong place and made a tenfold overestimate of its value. Spinach is no better for you than cabbage, Brussels sprouts, or broccoli. For a source of iron Popeye would have been better off chewing the cans (fig 1).

Frauds, hoaxes, fakes, and widely popularised mistakes run through the warp and woof of the history of science and medicine.



FIG 1—Popeye . . . would have done better to eat the cans.

National pride

Sometimes they become a matter of national pride. In 1903 René Blondlot, a distinguished French physicist at the University of Nancy, discovered N-rays, a new type of radiation. The rays were originally detected in the emissions of an electrical discharge tube but later were found to issue from a type of home gas light known as a Welsbach mantle and also from heated pieces of silver or iron, from the Nernst glower, and, more surprisingly, from the human body. They could be bent by an aluminium prism and were immediately put to use by Augustin Charpentier, the professor of medical physics at Nancy, to out-

line the border of the heart. Other workers, however, in various laboratories around the world could not find N-rays. Blondlot hit back. One needed a special sensitivity to see them, a sensitivity possessed only by the French. Anglo-Saxon powers of perception were dulled by continued exposure to fog and Teutonic ones were blunted by constant ingestion of beer.

Eventually the American physicist, R W Wood, set out to discredit N-rays. On a visit to Blondlot's laboratory he surreptitiously removed the aluminium prism from the N-ray machine. Despite the lack of this vital component the rays continued to bend. Wood concluded that N-rays, like beauty, were in the eye of the beholder.

The inscrutable Chinese also have their mysterious methods. What are we to make of the report in the Shanghai newspaper *Wen Hui Bao* that patients who were shown to Western doctors as undergoing major surgery under anaesthesia by acupuncture had, in fact, secretly been given large doses of pain killing drugs? As the pace of research increases so does the frequency of fraud. We have recently been shocked by stories of general practitioners conducting drug trials on mythical patients for money and astonished by the redoubtable Dr Alsabti.

Elias A K Alsabti, a Jordanian in the United States for post-graduate training, has published over 60 papers. It now seems likely that all were plagiarised. His technique was to raid the office filing cabinet for papers and grant applications sent for his chief to referee. These he pirated and published under his own name, mainly in Japanese and European journals. One grant application became the basis of three separate but identical review articles. Surprisingly, some of his papers were rejected. Not surprisingly the original authors began to realise that their work had been hijacked, and Alsabti was exposed. His explanations (a) that someone else had submitted the papers and forged his name and (b) that the original authors had, in fact, plagiarised him were mutually incompatible and implausible.

Plagiarism plus dishonesty

A more worrying case of plagiarism has also recently been exposed. The plagiarism itself was minor but was complicated by dishonesty, which caused heads to roll and a deep unease to settle over scientific medicine.

In 1978 Dr Helena Rodbard submitted a manuscript to the *New England Journal of Medicine* which reported her studies on insulin receptors in anorexia nervosa. After a long delay her manuscript was rejected. Some months later she was shown a similar paper sent to a colleague for his opinion by the *American Journal of Medicine*. Not only did this paper show similar results to her own, but some of the wording was identical. It turned out that one of its authors, Dr Philip Felig of Yale, was the very referee who had recommended that her paper be rejected by the *New England Journal of Medicine*.

After some argument and extensive investigation, Felig's associate, Dr Vijay Soman, was found to be the culprit. He had seen a copy of Dr Rodbard's paper when it was sent to Felig for review and had lifted some of the prose. The plagiarism was trivial, amounting only to some 60 words. What was worse was that the data in the Soman-Felig paper were imaginary. This paper was later withdrawn together with ten others written by Soman for which the raw results were either fudged, faked, or missing. Soman was dismissed and returned to India. Felig was innocent of everything except adding his name to Soman's papers and of failing to supervise his juniors. Nevertheless, he was forced to relinquish his chair of medicine at Columbia, a post he had occupied for just two months.

Junior worker syndrome

Soman was representative of the junior worker syndrome. He claimed that he was under pressure to publish and that grants and promotions depended on a constant stream of papers. He talked about the cut-throat pace of research. Others have felt the same pressure.

In 1980 Dr John C Long resigned from his post as assistant professor of pathology at Harvard Medical School. He admitted adding some faked results about the molecular weight of immune complexes to a paper that had been rejected by one journal, in an attempt to improve its chances of publication in another. It seemed at the time a sad aberration in a promising career. Dr Long it was, after all, who had succeeded in establishing the first long-term cultures of cells from Hodgkin's disease, producing the strongest evidence yet that it is a tumour of macrophages. Those who take a pessimistic view of the heart of man will not be surprised to learn that these long-term cultures have now been shown not to be human cells at all but to come from the North Colombian brown foot owl monkey. Whether or not the cultures were adulterated deliberately is not clear, but Dr Long undoubtedly dissembled when the first suspicions about the cell lines were voiced. Long claimed that "competition for Federal research grants" made him err. He erred with effect. In 1979, before the storm broke, he was given a three-year grant worth nearly half a million dollars.

Dr William Summerlin was the man at the Sloane Kettering Institute in New York who in 1973 solved the problem of transplant rejection. He claimed to have done it by holding the graft in tissue culture for a prolonged period before transplantation. In actual fact he did it with a felt tip pen, colouring a white skin graft black, making it appear to have come from an unrelated animal. He too was under enormous pressure at the time with a heavy clinical load, 25 research projects, and a boss who demanded more publications and bigger breakthroughs.

Professor Jack Schubert of Hope College, Michigan, is the leading proponent of mixed ligand chelation treatment, his theory being that catching hold of a heavy metal with two claws rather than one is far more efficient. In 1978 he published in *Nature* results that suggested that the clearance of cadmium and plutonium from the body was much greater when two chelating agents were used together than when either was used alone. Since plutonium was concerned the military were interested, and one hears stories of up to \$1m being spent in trying to repeat the work. Of course, it was not possible, and Schubert had to withdraw his results the following year. It transpired that his junior worker, S Krogh Derr, had fabricated the results by substituting the mice.

Another junior worker who erred was Robert Gullis, a post-doctoral biochemist, working in Germany on the effects of various drugs on the concentration of cyclic guanosine monophosphate in neuroblastoma cells. In 1977 he wrote to *Nature* admitting that the results he had published were mere figments of his imagination. He said that he was so convinced of his ideas that he simply put them down on paper without bothering to do the experiments.

Dr Marc J Straus, one time principal investigator of a large research team at Boston University, blames his junior workers for the deceit that occurred on his unit in 1978. What happened is clear enough; who was responsible is the subject of a \$33m conspiracy suit in the American courts. The 40-strong research team, funded to the tune of nearly \$1m by the National Cancer Institute, were co-operating in a multicentre drug trial organised by the Eastern Co-operative Oncology Group. Falsified data were submitted to the group by the Boston University team. At the time several team members insisted that the data had been doctored because of an anxiety that a shortage of statistically acceptable patients might threaten future funding. Straus resigned shortly afterwards and moved to New York. Now, just within the Statute of Limitations, he is suing five former members of his team. The case has all the hallmarks of a cause célèbre with calls for the resignation of the director of

the National Cancer Institute and even Senator Edward Kennedy getting in on the act.

The latest shocking revelation to emerge from America's Atlantic seaboard concerns the spectacular young Mark Spector and the respected biochemist Efraim Racker. Their work at Cornell University was so elegant and so important that it was strongly tipped for a Nobel prize. They seemed to have discovered no less than the cause of cancer. They postulated that a viral gene incorporated into the host DNA produces a protein kinase which awakens a dormant kinase cascade. This in turn amplifies the signal and causes the phosphorylation of cell membrane ATPase. This then acts less effectively and the membrane assumes cancer cell characteristics.

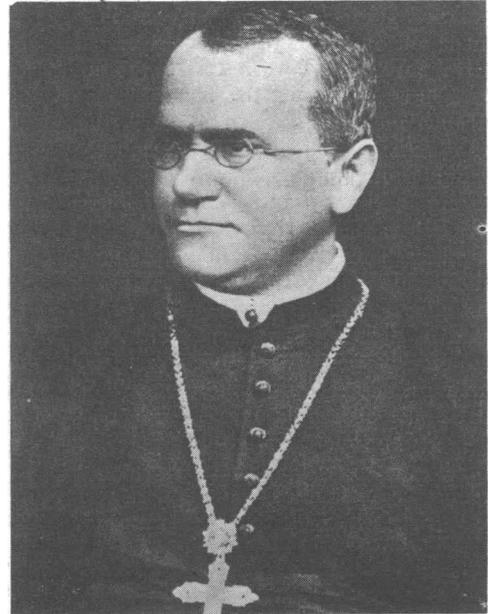


FIG 2—Gregor Mendel (1822-84). Did he cheat or was it a miracle? (By courtesy of BBC Hulton Pictures.)

Alas, it seems that Spector (or some ghastly and ghostly saboteur) was cooking the experiment. Radioactive iodine appeared where phosphorus should be and Racker banished Spector from the laboratory.

How much is the junior worker to blame for fraud? In most cases the senior man scarcely suffers, but is not his driving ambition, his conviction that he is right, at least equally at fault? The sad fact is that fraud is not confined to junior workers making their way in the world. Senior and respected scientists are equally capable of deceit and are particularly dangerous since their past reputation appears as an earnest of their honesty. It can happen that a theory or an idea becomes so much part of a man that it is unthinkable that he can be wrong. The question he then asks himself is not, "What is the answer?" but, "How can I get my point of view across?"

Sir Cyril Burt died in 1975, aged 92, full of fame and honours. He had been a pioneer educational psychologist who had greatly influenced the debate over the relative contribution of nature and nurture to intelligence. Burt's studies of identical twins separated at birth seemed to show that heredity rather than upbringing determined IQ. After his death Burt was accused of fabricating his results. His data contain several oddities and ambiguities, and two of his co-workers, Jane Conway and Margaret Howard, could not be traced. It was suggested that Burt had invented the two ladies and fixed his facts to support his prejudices. Unfortunately, the accusations came from those with equal and opposite prejudices. Recent studies of his work, however, leave little doubt that a cheat and fraud can rise to a position of in-

fluence and eminence, edit a learned journal, and receive a knighthood.

Theory of evolution

The theory of evolution, which underpins so much of modern medicine, has been the subject of fiercely held views and is, as a consequence, it seems, a happy hunting ground for fakers, forgers, and frauds.

Darwin's original idea of how variation could be inherited was by a sort of blending of parental characteristics. When, in 1867, this was shown to be mathematical nonsense, he resurrected the inheritance of acquired features and inserted a Lamarckian chapter into the sixth edition of *Origin of Species*. Ironically, a more acceptable answer had already been published by Mendel (fig 2) two years earlier, but his work was ignored until 1900.

In the early part of this century a battle royal was waged between the Lamarckians and Mendelians. Champion of the former was Paul Kammerer, the Austrian zoologist, whose great work was to breed the midwife toad in captivity. Most frogs and toads mate in water. To get a firm grip on the female's slippery body the male toad develops in the mating season black horny spines on the hands, known as nuptial pads. The midwife toad mates on land and neither needs nor possesses nuptial pads. Kammerer claimed that in 1909 he induced the midwife toad to copulate in water for several generations and that they eventually developed nuptial pads as an acquired hereditary feature. The Mendelians would have none of it and harried Kammerer for 15 years. In 1926 the scientific world was shaken by the revelation that Kammerer's nuptial pads had been faked with Indian ink injections. Within two months Kammerer killed himself. Interestingly, ten years later Mendel's own results came under



FIG 3—Professor Rudolf Virchow (1821-1902). Debunker of ape-men . . . and of Haeckel. (By courtesy of Wellcome Trustees.)

scrutiny. Sir Ronald Fisher, the famous statistician, proved conclusively that Mendel's published figures must have been doctored. They were so close to the expected ratio of 3:1 that it would have taken an "absolute miracle of chance" to produce them. Mendel had the luck to be right, and history has treated him kindly. His gardeners were possibly to blame or perhaps he stopped counting accurately when he established his point.

For a long time the Darwinian viewpoint, although intellectually attractive to scientific humanists, suffered from a lack of supporting evidence. The great pathologist Rudolf Virchow (fig 3) had dispatched Neanderthal man, the only candidate for the

missing link, as *Homo sapiens* with rickets, a view that modern science has shown to be essentially correct. Virchow's former student, Ernst Haeckel (fig 4), professor of zoology at Jena, set out to prove the case. He proposed the (now discredited) theory that an embryo retraces its evolutionary history in utero. For example, the so-called gill slits in the human embryo were evidence of our supposed fishy origins. Haeckel not only altered his illustrations of embryos to support his case but actually printed the same plate of an embryo three times and labelled one human, the second a dog, and the third a rabbit "to show their similarity."

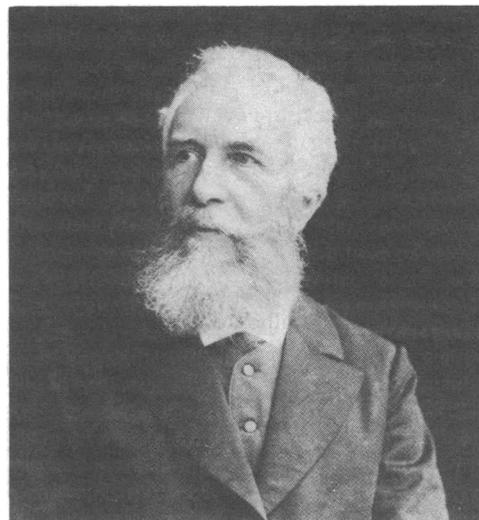


FIG 4—Professor Ernst Haeckel (1834-1919). Convicted of fraud yet retained his reputation. (By courtesy of Wellcome Trustees.)

He was charged with fraud and convicted by a university court at Jena. He admitted that he had faked his results but defended himself in the following manner: "I should feel utterly condemned and annihilated by the admission were it not that hundreds of the best observers and biologists lie under the same charge." Haeckel retained his chair and, surprisingly, his reputation. Virchow, however, considered him a fool.

Haeckel's next endeavour was to invent Java man and send Eugene Dubois, his former student and at that time a doctor in Holland, to look for him. In 1891 Dubois found him on the Solo River at Trinil—the skull cap from an ape-like creature and, nearly 15 m away, a human femur and two teeth. Thus was born the *Pithecanthropus erectus*. Haeckel telegraphed his congratulations from the "inventor of Pithecanthropus to his happy discoverer."

In Virchow's opinion the skull cap came from a giant gibbon and the human femur had no connection with it whatsoever. Before his death in 1940 Dubois came round to the same point of view.

Pitldown man

The most spectacular fake of all time was undoubtedly Pitldown man. The question that remains is, "Who dun-it?" Dawson, the enthusiastic amateur, shouldered most of the early blame but I think that most unlikely. The filing of teeth and jaw required anthropological expertise that he did not possess, and the staining of the bones with ferric ammonium sulphate and chromium salts needed a high degree of chemical knowledge.

It has recently been suggested that Professor W J Sollas perpetrated the hoax to discomfit his arch enemy, Smith Woodward, but if that were so why was it not exposed during his lifetime? Indeed the long latent period before exposure makes it unlikely that it was a hoax at all, more an honest attempt at deceit.

Most people forget about the third worker on the site, mistakenly thinking him to have left England permanently before the excavations were complete or being unwilling to implicate such a famous man. In fact, Teilhard de Chardin returned to England in 1914 before the last fossils were found. He was an anthropologist who had lectured on chemistry at Cairo University. There are two further pieces of evidence that point in his direction. One is a Stegodon tooth "found" at Pilt-down and now shown to be radioactive. Such teeth come only from Ichkeul near Bizerta in Northern Tunisia. Teilhard is known to have camped near there while in North Africa. The other is an elephant bone tool typical of the Dordogne. Teilhard was born not a hundred miles away and was familiar with local artefacts.

His motive? To support his strange harmonisation of evolution and religion which he described in *The Phenomenon of Man*. Malcolm Bowden in his book *Apeman—Fact or Fallacy* has further implicated Teilhard in covering up evidence that would have discredited Peking man and with planting further evidence in Java. If Bowden is right then Teilhard certainly deserved the title "Faker of the century."

Underside of a stone

How secure is our body of scientific knowledge? Is more of it fraudulent than we suspect? In his book *Advice to a Young Scientist* Sir Peter Medawar writes of a scientist who plagiarised a number of photographs and several paragraphs of text from a fellow worker and included them in a prize essay. One of his judges was the man from whom the work had been stolen. In the furore that followed the culprit was quietly redeployed into

another institution and has pursued a moderately successful career of petty crime ever since. Medawar does not name the criminal, but if he is known about, how is he allowed to prosper? Is it that he is showing the underside of a stone that none of us would like to turn over in our own lives? A questionnaire in *New Scientist* in 1976 uncovered 189 instances of fraud known to its readership.

Sometimes in the long nights this worries me. Christmas is a good time for confession. If you have a nagging secret in your curriculum vitae that worries you write and tell me about it. If you prefer to do it anonymously I won't betray your confidence. I'd just like to know.

Having spent so much of my time talking about people whose work was unoriginal, I should mention that little of my article is based on original work but has been derived from the publications of others. Among these I should particularly like to mention:

- Arther Koestler: *Case of the Midwife Toad*. London, Hutchinson.
 Malcolm Bowden: *Ape Men—Fact or Fallacy*. Bromley, Sovereign Publications.
 William J Broad: *Science* 208:1438-40, 209:249, 210:38-41, 171-3.
 Colin Tudge: *World Medicine* 1974 Jul 17:34.
 Leon Kamin: *New Society* 1976 Dec 2:460-1.
 Marjorie Sun: *Science* 1981;212:1366-7.
 D D Dorfman: *Science* 1978;201:1177-88.
 Ian St James Roberts: *New Scientist* 1976 Nov 25:466-7.
 C Joyce: *New Scientist* 1981 Apr 9:68-9.
 D Dickson: *Nature* 1981;289:227.
Nature 1980;286:433, 831-2.
Lancet 1976;ii:1066-7.
British Medical Journal 1980;281:41-2.

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Good servants are scarce

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"The cook was a good cook as cook's go, and as cooks go she went."—SAKI.

In the 1880s the newly established post of medical officer of health was looked on with suspicion both by the general public and by the profession, and it was still a time when people would enter wholeheartedly into medical controversies in the "Wakley" tradition.

It made it so easy to put a foot wrong, as my grandfather found when, recently appointed to such a post, he attended the International Congress of Hygiene, where he drew attention to the heavy pall of black smoke that hung perpetually over the borough he represented. On his return he found that his remarks had brought down on him the full wrath of the "city fathers"; for was not this heavily polluted atmosphere the finest sign of the town's prosperity.

It was not until 70 years later that he received some belated recognition of his stand from Dr Edith Summerskill¹ in the debate on the Clean Air Bill when she quoted that "the scene from the top of the parish church spire, far away below you, is exactly like the three weird sisters in *Macbeth*. The adjacent

chimneys belch their blackness out into the poisoned air; a score of other chimneys close at hand contribute to the gathering cloud; and over the remoter portions of the town it broods in one unbroken pall," adding that "poor Dr Gornall, the medical officer of health, once got into dreadful trouble by referring to this frightful local scourge at a sanitary congress."

Compulsory vaccination

Having learnt his lesson on that, surely he could not be faulted on vaccination, of which he was a dedicated exponent all his life, despite the absurd charges made by the anti-vaccination league and even the opposition of some leaders of the profession. The first Vaccination Act (1840) had not been very successful but it did prohibit the more dangerous practice of variolation: small-pox was still endemic with occasional fierce outbreaks, but compulsory vaccination (1853) had come in while he was training, and he had learnt the arm-to-arm technique from his uncle, to whom he was apprenticed; dry points were often in short supply.

Before he had been in office many years as medical officer of health and public vaccinator, the Government established an animal vaccine depot and the arm-to-arm procedure was forbidden (1881). The supply of lymph (some of it calf) now being assured and, despite much evasion of the compulsory vaccination, he thought he was all set to make a good showing if an epidemic hit the town. There was also a bonus for him in the help of his son, straight from the pioneer pathological labora-

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