

Something up Dawson's sleeve?

SIR — I should like to add to Henry Gee's summary of Brian Gardiner's suspicions about Martin Hinton as the forger of the Piltdown fossils¹. Just a few years ago, Frank Spencer² accused Sir Arthur Keith of being the forger. Anyone who knew Keith well would not entertain such a ridiculous verdict, but Spencer had him guilty from the first sentence, and then, with winks and nods, pinned him down as the forger. But Spencer could have incriminated any of the suspects he mentioned, including Hinton, for the book reads like a 'whodunit'. Now Hinton is accused of being the forger because he invented the stain found on the so-called fossils supposedly recovered at Piltdown.

There are three questions to be answered. When did Hinton invent the stain? Who else could have had access to the stain? Was Hinton knowledgeable enough in human anatomy to so damage the jawbone in places vital for distinguishing between human and simian bones?

If Hinton stained the bones, he did so when he was a volunteer worker at the Natural History Museum. But the stained bones had to be transported to Piltdown — or had they? What is the proof that the bones picked up at Piltdown were the forged fossils demonstrated at the museum?

What has been established is this: Arthur Smith Woodward, the keeper of palaeontology at the museum, and Charles Dawson were present at Piltdown when the cranial fragments were found; and Smith Woodward and Dawson were present at Piltdown when the right half of the mandible was found.

There are reports by Smith Woodward and Dawson testifying to these statements. According to what Smith Woodward wrote many years later, and introduced in Spencer's book² (page 34): "Mr Dawson was exploring some untouched remnants of the original gravel at the bottom of the pit, when we both saw the half of a human lower jaw fly out in front of the pick-shaped end of the hammer which he was using."

Now either that statement is a true account of the discovery of the mandible or it is not. If it is true and Hinton is the supposed forger, then he must have had access to the pit and placed (in "untouched remnants") the mandible at the bottom of the pit some four feet down. Hinton was one of the Ightham Circle men and so could have bribed the farm worker Venus Hargreaves to plant the mandible and consolidate the soil afterwards. All that takes some believing. On the other hand, Dawson could have concealed the mandible in the sleeve of his shirt.

Spencer was unable to find any evidence

that Hinton had any direct dealings with Dawson. Keith points out in his autobiography³ (page 324): "As a palaeontologist Smith Woodward enjoyed, and deserved, the highest reputation, but he had no special knowledge of the human body". If we consider what Keith stated about the mandible in his *Antiquity of Man*⁴ we find that he was sceptical from the moment he was shown the bones.

Here are a few of his comments: "In the Piltdown mandible the conformation is that of an ape" (page 507); "Piltdown jaw should be linked with a skull which is distinctly more anthropoid than the one actually found"; "The very part of the jaw — the condyle — which we most need to give us the form of contact with the skull is broken away" (pages 645–647); "We have seen that in many features the Piltdown mandible resembles that of the chimpanzee" (page 652).

It may be that the mandible really was broken at the vital distinguishing parts when it was admitted to the museum collection some time previously. Someone like Smith Woodward would not be aware of the significance of the missing parts, but a skilled human anatomist, such as Keith, would, as he pointed out on many occasions.

Dawson carried out staining techniques as indicated by the contents found in Harry Morris's cabinet. The Piltdown bones were found by Dawson and Smith Woodward and presented by them to the scientific establishment. Need we look any further for the forgers?

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1. Gee, H. *Nature* **381**, 261–262 (1996).
2. Spencer, F. *Piltdown — A Scientific Forgery* (Natural History Museum/Oxford Univ. Press, 1990).
3. Keith, A. *An Autobiography* (Wattson, London, 1950).
4. Keith, A. *Antiquity of Man* (Williams & Norgate, 1929 edn).

Is the Pope an alien?

SIR — A syllogism is a form of deductive reasoning which, contrary to the claim of Beck-Bornholdt and Dubben¹, is not the model for the inductive reasoning of a test of significance.

Tests of significance are usually reasonable because an improbable event alerts us to the possibility that the hypothesis on which the calculation of the probability was based might be able to be replaced by a better hypothesis leading to a higher probability. Obviously, the greater the original improbability (P value small) the

greater the scope for improvement.

In the case of Beck-Bornholdt and Dubben's bizarre example, the conclusion is not that Pope John Paul II is not a human being but that the null hypothesis that popes are selected at random from the world population is false.

It is not correct to state that "no alternatives are available" to tests of significance. The likelihood approach to statistical inference, which encapsulates the idea of assessing rival hypotheses according to their probabilities of generating the data, is not only a non-Bayesian alternative to the 'repeated sampling' methods of which tests of significance are an example, but is itself the best explanation for why tests of significance are usually reasonable procedures.

Likelihood was first given serious consideration by R. A. Fisher² (indeed, he gave the word its technical meaning long before he coined the phrase 'null hypothesis'), and has increasingly come to play an important role in science, especially in the biological sciences. I discussed the relationship between likelihood and tests of significance many years ago in Chapter 9 of *Likelihood*³.

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1. Beck-Bornholdt, H.-P. & Dubben, H.-H. *Nature* **381**, 730 (1996).
2. Fisher, R. A. *Statistical Methods and Scientific Inference* (Oliver & Boyd, Edinburgh, 1956).
3. Edwards, A. W. F. *Likelihood* (Cambridge Univ. Press, Cambridge, 1972; Johns Hopkins Univ. Press, Baltimore, 1992).

Right to publish

SIR — You report in a recent News story (*Nature* **381**, 458; 1996) the controversy surrounding the publication of a scientific paper from a jailed professor.

Jailing a criminal is a punishment and serves to prevent the criminal from committing his crime again. It is also hoped that imprisonment may serve to transform and educate the criminal into becoming a useful and honest member of society even from within the prison.

If a jailed criminal produces a work useful to society, should we not permit society to use this work? If a criminal writes a sound scientific communication, should not we allow it to be published?

In my opinion, publication should be permitted provided that the criminal does not profit financially.

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