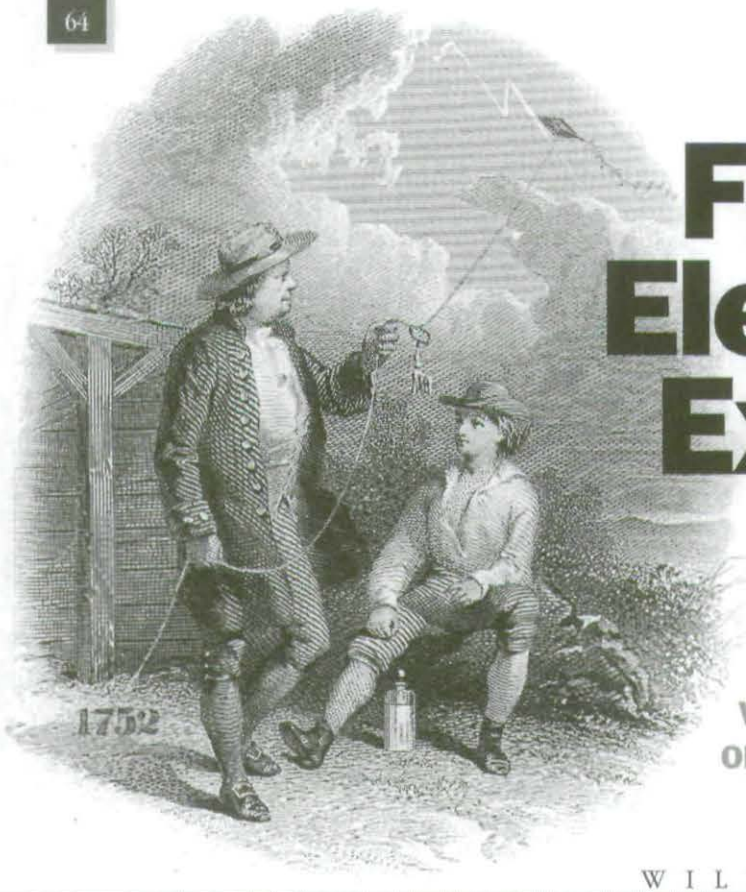

Franklin's Electric Kite Experiment

Did Benjamin Franklin really fly a kite to prove that lightning and static electricity were one and the same or was it all just a hoax?

WILLIAM D. STANSFIELD

AS A YOUTH, I LEARNED THAT BENJAMIN Franklin (1706-1790) flew a kite in a thunderstorm and drew lightning from the sky. I doubt that I ever knew why he did it, but I thought even then that he must have been crazy to do such a dangerous stunt. My concerns were for naught because, for one thing, he did not draw a lightning bolt down his kite string. Nor, according to Tom Tucker[1], did he ever construct or fly such a kite. Whoa Nelly! Heresy! Didn't Franklin state in writing that he flew an electric kite?

In his book *Bolt of Fate: Benjamin Franklin and His Electric Kite Hoax*[1], Tom Tucker believes that Franklin only intimated that he did the kite experiment as a hoax to get even with a certain member of the Royal Society of London who not only ignored some of his letters, but ridiculed some of his ideas at meetings of the Society, and plagiarized others. My dictionary defines a *hoax* as "An act intended to deceive or trick, either as a practical joke or a serious fraud." In his review of Tucker's book, Jessie Thorpe[2] claims that, if you follow Tucker's reasoning, it is difficult to conclude that Franklin did not perpetrate fraud. If not fraud, this leaves Franklin's hoax, if one has been committed, as a practical joke. Did Franklin have a reputation as a jokester? You bet he did, at least in the parts of his life outside of science![3,4]

The Kite Experiment

In June 1752, Franklin proposed to place an electrical conductor as close to the clouds as possible to draw electricity from the same source where lightning seems to originate. He proposed to use a kite for this purpose. If he could draw a spark from a key at the base of the string with his hand, or charge a Leyden jar (an early type of condenser for storing an electrical charge) by touching the key to it, then he thought he would have proved that lightning and static electricity were identical, differing only in the magnitude of the discharge.

An article by Franklin appeared in *The Pennsylvania Gazette* on October 19, 1752, intimating that he had flown an electric kite. He sent a copy to his friend Peter Collinson (a member of the Royal Society of London) who relayed it to the Royal Society, where it was published in its *Philosophical Transactions* about a year later. Here it is:

Illustration: *Franklin and Electricity*, Artist: American Bank Note Company. ID # RF F85 comp am E – [xx35].
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As frequent mention is made in the public papers from Europe of the success of the Philadelphia experiment for drawing the electric fire from clouds by means of pointed rods of iron erected on high buildings, &c., it may be agreeable to the curious to be informed, that the same experiment has succeeded in Philadelphia, tho' made in a different and more easy manner, which anyone may try, as follows:

Make a small cross, of two light strips of cedar; the arms so long, as to reach to the four corners of a large thin silk handkerchief, when extended: tie the corners of the handkerchief to the extremities of the cross; so you have a body of a kite; which being properly accommodated with a tail, loop, and string, will rise in the air like those made of paper; but this, being of silk, is fitter to bear the wet and wind of thunder-gust without tearing.

To the top of the upright stick of the cross is to be fixed a very sharp-pointed wire, rising a foot or more above the wood.

To the end of the twine, next [to] the hand, is to be tied a silk riband [ribbon]; and where the twine and silk join, a key may be fasten'd.

The kite is to be raised, when a thunder-gust appears to be coming on, (which is very frequent in this country) and the person who holds the string, must stand within a door, or window, or under some cover, so that the silk riband may not be wet; and care must be taken, that the twine does not touch the frame of the door or window.

As soon as any of the thunder-clouds come over the kite, the pointed wire will draw the electric fire from them; and the kite, with all the twine, will be electrified; and the loose filaments of the twine will stand out in every way, and be attracted by the approaching finger.

When the rain has wet the kite and twine, so that it can conduct the electric fire freely, you will find it stream out plentifully from the key on the approach of your knuckle.

At this key the phial [Leyden jar] may be charged; and from electric fire thus obtain'd spirits may be kindled [alcohol may be ignited], and all other electrical experiments be performed, which are usually done by the help of a rubbed glass globe or tube, and thereby the sameness of the electric matter with that of the lightning completely demonstrated.

Critiques

It should be noted in Franklin's letter that he did not say that he or anyone else performed the kite experiment he proposed. The verbs are future conditional tense, hardly the voice one would use for an experiment that had already been performed. The writing was atypical for reporting the results of a scientific experiment (no date, time, location, witnesses, rain amount, air humidity, length of kite tail, length of kite string in the air, weight of the key, results of charging a Leyden jar, lightning strikes seen and thunders heard, etc.).

Joseph Priestley (1733-1804) was an English clergyman and chemist who, with Carl Scheele of Sweden, became famous for the discovery of oxygen. Priestley met Franklin for the first time in 1766 and became interested in doing electrical experiments of his own. The following year (1767), about fourteen years after the kite experiment protocol was published, Joseph Priestley (with the help of Franklin) published a second-hand account of the kite experiment in his *History and Present State of Electricity*.[5] The first accounts (1752-53) did not give a date or even a month when the kite experiment was performed. Priestley, however, cites June 1752. If true, Tucker wonders why it took almost four months before Franklin's experiment was reported, and then in a newspaper. It took about another six weeks ship transit time to reach England before the Royal Society learned the news.

In his first account, Franklin states that "electric fire comes down the string." Priestley's version, however, says that Franklin "contrived actually to bring lightning from the heavens." Priestley even said that Franklin "presented his knuckle to the key" and "perceived a very evident electric spark." Franklin's statement that "thereby the sameness of the electrical matter with that of the lightning [is] completely demonstrated" may not satisfy skeptics because no one reported seeing lightning strike the kite or string. Tucker claims that he built a kite according to Franklin's description: "It never got off the ground at windspeed 15-20 miles per hour." The *Mythbusters*[6] of TV fame also built a kite according to Franklin's specifications and it too failed to fly.[7]

Tucker was not the first to question the kite experiment or the chronology of Franklin's science letters. For example, Carl Van Doren's biography *Benjamin Franklin*[8] devotes six pages

"to the inconsistencies of the kite and [lightning] rod announcements." More than thirty years after Franklin's kite experiment was first published, he finally stated in his autobiography (first published a year after he died) that he did the experiment: "I will not swell this narrative with an account of that capital experiment, nor of the infinite pleasure I receiv'd in the success of a similar one I made soon after with a kite at Philadelphia, as both are to be found in the histories of electricity."[9]

A skeptic may question whether a person can accurately remember in his autobiography what actually occurred twenty or more years ago. Tucker admits that "There's no proving that Franklin *never* flew his kite. It will always remain possible. But this experiment he presented as convenient and likely turns out to be dauntingly inconvenient." Given the circumstantial evidence presented by Tucker, the Mythbusters, and other critics against Franklin having performed his electric kite experiment, skeptics may wonder if scientists today are in any better position to render a decision—one way or another—on Franklin's most famous experiment. ▼

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