From Benjamin Franklin to Thomas-François Dalibard, 29 June 1755

To Thomas-François Dalibard

Copy (extract): The Royal Society; printed (in full) in Benjamin Franklin, *Expériences et Observations sur l'Electricité faites à Philadelphie en Amérique*, Thomas-François Dalibard, trans. (2d edit., 2 vols., Paris, 1756), II, 307–19.

Peter Collinson presented the scientific portions of this letter to the Royal Society on Dec. 18, 1755; it was printed in the Philosophical Transactions,[6] and has been frequently reprinted since. The personal parts — the first three and the last paragraphs and one in the middle — survive only in Dalibard's translation of Franklin's Experiments and Observations. The editors have decided to follow the Royal Society manuscript copy and to add their own retranslation of the several French paragraphs.

Sir, Philadelphia 29 June 1755

I have for a long time owed you a reply to your last letter dated June. 20, 1754.[7] I received it in January last while I was at Boston in New England,[8] and since then I have been so occupied by my travels in different places and with public business that I am extremely behind with my correspondents.[9]

I sent you last year a manuscript containing some new experiments and observations on lightning;[1] I do not know whether you have received it, but it has been since printed at London, and I imagine that our good friend Mr. Collinson will have sent you a copy.

I thank you for your kindness in sending me the four volumes of M. de Buffon's Natural History, the maps, &c.[2]

You desire my opinion of Pere Beccaria's Italian Book.[3] I have read it with much Pleasure, and think it one of the best pieces on the Subject that I have seen in any Language. Yet as to the Article of Waterspouts, I am not at present of his Sentiments; tho' I must own with you, that he has handled it very ingeniously. Mr. Collinson has my Opinion of Whirlwinds and Waterspouts at large, written sometime since: I know not whether they will be publish'd; if not, I will get them Transcrib'd for your Perusal. It does not appear to me that Pere Beccaria doubts of the *absolute Impermeability of Glass* in the sense I meant it; for the Instances he gives of Holes made thro' Glass by the electric Stroke, are such as we have all experienc'd, and only shew that the electric Fluid could not pass without making a Hole. In the same Manner we say, Glass is impermeable to Water, and yet a Stream from a Fire Engine will force thro' the strongest Panes of a Window. As to the Effect of Points in drawing the electric Matter from Clouds and thereby securing Buildings, &c. which you say he seems to doubt, I must own I think he only speaks modestly and judiciously. I find I have been but partly understood in that Matter. I have mentiond it in several of my Letters, and except once, always in the *Alternative*, viz. that pointed Rods erected on Buildings, and communicating with the moist Earth would either *prevent* a Stroke, *or*, if not prevented, would *conduct* it, so as that the Building should suffer no Damage. Yet whenever my opinion is examin'd in Europe, nothing is consider'd but the Probability of those Rods *preventing* a Stroke, or Explosion, which is only a *Part* of the Use I proposed from them, and the other part, their conducting a Stroke which they may happen not to prevent, seems to be totally forgotten, tho' of equal Importance and Advantage.[4]

I shall be very glad to be acquainted with the experiments of M. le Roy on positive and negative electricity, when you can impart them to me.[5]

I thank you for communicating M. de Buffon's Relation of the Effect of Lightning at Dijon on the 7th of June last.[6] In return give me leave to relate an Instance I lately saw of the same kind. Being in the Town of Newbury in New England in November last, I was shewn the Effect of Lightning on their Church, which had been struck a few Months before.[7]

The Steeple was a Square Tower of Wood, reaching 70 feet up from the Ground, to the place where the Bell hung, over which rose a Taper spire, of Wood likewise, reaching 70 Foot higher, to the Vane or Weather Cock.

Near the Bell was fix'd an Iron Hammer to strike the Hours; and from the Tail of the Hammer a Wire went down thro' a small Gimlet Hole in the Floor that the Bell stood upon, and thro' a second Floor in like manner; then horizontally under and near the plaister'd Cieling of that second Floor, till it came near a plaister'd Wall; then down by the side of that Wall to a Clock, which stood about 20 feet below the Bell. The Wire was not bigger than a common Knitting Needle. The Spire was split all to pieces by the Lightning and the parts flung in all Directions over the square in which the Church stood, so that nothing remain'd above the Bell.

The Lightning pass'd between the Hammer and the Clock in the abovemention'd Wire, without hurting either of the Floors or having any Effect upon them, except making the Gimlet Holes, thro' which the Wire pass'd, a little bigger, and without hurting the plaister'd Wall, or any part of the Building so far as the aforesaid Wire and the Pendulum Wire of the Clock extended, which latter Wire was about the Thickness of a Goose Quill. From the End of the Pendulum down quite to the Ground, the Building was exceedingly rent and damaged, and some Stones in the Foundation Wall torn out, and thrown to the Distance of 20 or 30 feet. No part of the aforemention'd long small Wire, between the Clock and the Hammer, cou'd be found, except about two Inches that hung to the Tail of the Hammer, and about as much that was fastened to the Clock; the rest being exploded, and its particles dissipated in Smoke and Air, as Gunpowder is by common Fire, and had only left a black smutty Track on the Plaistering, three or four Inches broad, darkest in the middle, and fainter towards [8] the Edges, all along the Cieling under which it passed, and down the Wall. These were the Effects and Appearances; on which I would only make the few following Remarks. Viz.

1. That Lightning, in its passage thro' a Building, will leave Wood to pass as far as it can in Metal, and not enter the Wood again till the Conductor of Metal ceases.

And the same I have observ'd in other Instances, as to Walls of Brick or Stone.

2. The Quantity of Lightning that pass'd thro' this Steeple must have been very great by its Effects on the lofty Spire above the Bell, and on the Square Tower all below the End of the Clock pendulum.

3. Great as this Quantity was, it was conducted by a small Wire and a Clock pendulum, without the least Damage to the Building so far as they extended.

4. The Pendulum Rod being of a sufficient Thickness, conducted the Lightning without Damage to itself, but the small Wire was utterly destroy'd.

5. Tho' the small Wire was itself destroy'd, yet it had conducted the Lightning with safety to the Building.

6. And from the Whole it seems probable, that if even such a small Wire had been extended from the Spindle of the Vane to the Earth, before the Storm, no Damage would have been done to the Steeple by that Stroke of Lightning, tho' the Wire itself had been destroy'd.

I apprehend that M. de Buffon's Natural History will give me much pleasure and teach me greatly. Assure him, I beg you, of my respects, as well as M. de Fontferrière, [9] who have both given me tokens of their remembrance in your last letter. I am, &c. [1]

B. Franklin

[Note numbering follows the Franklin Papers source.]

6. xlix, pt. 1 (1755), 305–9. The Royal Society's editor added a note on the ms that it had been "inclosed in a Letter to Mr. Peter Collinson F.R.S." bf's letter also appeared in his *Exper. and Obser.*, 1769 edit., pp. 161–4, and 1774 edit., pp. 168–72.

7. Not found.

8. bf actually left Boston December 30.

9. This and the two following paragraphs have been retranslated from Dalibard's French edition.

1. See above, v, 68–79.

2. In his letter of March. 31, 1754 (see above, v, 253), Dalibard had promised to send these and other articles to BF by the first conveyance to London.

3. Giambatista Beccaria, *Dell' Elettricismo Artificiale, e Naturale* (Turin, 1753). Footnote in *Exper. and Obser*., 1769 edit., p. 161: "This work is written conformable to Mr. Franklin's theory, upon artificial and natural Electricity, which compose the two parts of it. It was printed in Italian at Turin, in 4to. 1753; between the two parts is a letter to the Abbé Nollet, in defence of Mr. Franklin's system. J.B." The 1774 edition, p. 168, identified "J.B." as John Bevis. See also above, v, 395–6.

4. Footnote in *Exper. and Obser*., 1774 edit., p. 169: "Notwithstanding this complaint of the author's, repeated in four editions of his papers, he continues to be misunderstood and misrepresented in this particular, as if he considered it as the *sole* use of pointed rods, that they might *draw off* the lightning from the clouds and, *prevent* a stroke; and the very instances adduced by him to show that the rods had protected houses, by *conducting* the lightning *when there was a stroke*, proved by its having melted the points, are said to be instances of conductors being UNSUCCESSFUL, — in a pamphlet entitled, *Observations upon Lightning*, &c. just published, 1773." This pamphlet was Benjamin Wilson's *Observations upon Lightning, and the Method of Securing Buildings from it's Effects* (London, 1773). BF's copy, with his marginal notes and marks, is in Yale Univ. Lib.

5. Jean-Baptiste LeRoy, "Mémoire sur l'électricité, où l'on montre … qu'il y a deux espèces d'électricité, l'une produite par la condensation du fluide électrique, et l'autre par sa raréfaction," *Histoire de l'Académie Royale des Sciences*, 1753, pp. 447–74. See also *ibid*., 1755, pp. 22–7. This paragraph has been retranslated from Dalibard's French edition.

6. See Gabriel Dumay, *Le Mercure Dijonnois* (Dijon, 1887), p. 69.

7. For another description by BF of this accident, see above, v, 500–1.

8. In *Phil. Trans*. and other printed versions, "towards" or "toward," though the space in the MS seems to allow only "to" or "at."

9. Not identified.

1. This paragraph and the complimentary close are retranslated, and the signature is added, from Dalibard's French edition.

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the public.