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Other Things Are Never Equal

Explicitly or implicitly, attached to each law of empirical science is a clause that reads: "other things being equal." For example, one says, or at least means, "all bodies fall with a constant acceleration, other things being equal," or "water always puts out fire, other things being equal." This clause allows for the fact that a law is not necessarily disproved by those instances in which the law fails to hold true, since it may be that other things are not equal. It is well known that bodies do not fall through the earth's atmosphere with a constant acceleration, and that water does not put out burning oil.

A simple requirement prevents this property of experimental laws from degenerating into a situation in which each law is found to hold true except when it is *not* found to hold true. Scientists demand evidence for the existence of the condition that defeats a law, other than the failure of the law itself. For example, one can determine the presence of the earth's atmosphere independently of the failure of Galileo's law and one can determine the presence of burning oil independently of the failure of water to put out fire.

Unfortunately, the logic of scientific inquiry can serve mammon as well as truth. Imagine a manufacturer who, in effect, claims that his product works only under certain special conditions. If upon investigation, the product fails to perform as promised, well, then, other things are not equal. By introducing a long list of difficult special conditions, the manufacturer can explain away his product's failure and make its successes difficult to reproduce. After all, when a series of experiments is run, the conditions are bound to change. If the investigator takes the precaution of wearing the same necktie throughout, that necktie will be a bit more frayed at the close of the series than it was at the start. As the well-grounded skeptic knows, other things are never exactly equal.

In a recent editorial [*Science* 123, 1059 (15 June 1956)], we reported some aspects of the Federal Trade Commission's hearing of the AD-X2 battery additive. In an article in the present issue (page 1107), we offer a more extended account of another case, the Evis Water Conditioner. Both developments illustrate in a small way this logic of other things that are never equal. We do not intend to devote our journal to the rulings of the Federal Trade Commission, but we should like to share our concern about their doings.

Something close to despair must engulf the scientist who watches the instruments of his calling, and his reluctance to claim certainty, turned against him.—J. T.