An evaluation of a molecular binding force meter

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According to the specifications obtained from the extraterrestrials, "*the binding meter consists of a nylon fiber which is stressed close to its elastic limit (after having been over-stressed to establish stability) pulling against a steel spring which is stressed well below its elastic limit.*" Further, Smith found that "*a range of temperature of 100°F makes less than 1/2 division on an arbitrary scale of 12. There is no perceptible change over the complete range of humidity and no barametric sensitivity was observed. Dimensions apparently are not critical, and successful instruments have been made with quite a variety of parameters*".

Pictures of binding force meters constructed by Smith are shown here and here. In both images, materials with different tensile strengths are pitted against each other. When the molecular binding force changes, the length of one material is expected to alter more than the other, and the meter measures this relative change in length.

Two different meters were constructed based on this principle. The Mark I meter pits a 20 lb. monofilament nylon fishing line against a strong spring, and the Mark II meter pits the nylon fibre against a metal wire normally used as a guitar string. In both cases, a change in length of the nylon fibre results in deviation of a scale pointer. The pointer in the Mark I meter consists of a rigid wire that tended to vibrate excessively when inside a moving vehicle, so this meter was useful for measuring only large deviations under these conditions. (A Mark III meter was designed and built after the following experiment was over. It pits the nylon fibre against the metal spring of a fisherman's scale, so a change in binding force in the spring relative to the nylon fibre is detected as a change on the weight scale.)

The experiment was conducted during a trip from Ottawa to Brantford via Toronto. At the beginning of the trip, the pointers of both meters were positioned at mid-scale. Due to the vibration issue, however, readings were obtained from only the Mark II version. Its pointer remained solidly on the center or zero from Ottawa to Toronto. A small deviation (~ -0.05) was observed while passing through Toronto, and this increased to -0.1 upon arrival in Brantford. A few hours later, the pointer returned to its center position where it remained for more than a 24-hr period. Then it was observed to move to the +0.1 position where it remained until the return trip the following day when it crept back to the center position while passing through Toronto.

The small observed changes were quite likely due to known environmental factors such as humidity and temperature. Humidity, in particular, is known to affect the elasticity of a nylon fibre. Although, humidity was not measured, there were marked shifts in rainy and dry periods that might have correlated with the small changes in meter position.

Smith was aware of the potential environmental effects on the meter, and he observed these effects to be quite small relative to the larger movements due to changes in molecular binding force. It is clear that this experiment did not find an effect that could be attributed to a change in such a force. Therefore, the conditions no longer exist in the Toronto area that led to the large deviation in binding force 50 years ago. According to the extraterrestrial information, this might well be due to the cessation of nuclear testing since that time.

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