

H. *Some Remarks upon the Observation mentioned in the foregoing Letter. By Mr. William Beckett, Surgeon, F. R. S.*

THE remarkable Difference in the Stature of human Bodies, in the Space of a few Hours time, taken Notice of in the Reverend Mr. *Wasse's* Letter, read before the Society this Day Sevensnight, I have since found to be Fact, by several Experiments made with the greatest exactness I have been capable of. Only this I have farther observed, that in those Persons who have been young, the Alteration has been more considerable than in those that have been aged. The Trials equally succeeding in a sitting as in a standing Posture, will naturally lead us to believe, that it must necessarily be from the Trunk of the Body, or some of its Parts, that this remarkable Alteration is brought about. Now every Body knows, that the Standard of a Person's Stature has been always looked upon to be determined by the whole *Compages* of the Bones, adjusted by the Divine Architect according to the strictest Rules of Geometry.

But there is something so wonderful in the Structure and Disposition of the Spine, that nothing but such a peculiar Contrivance could so curiously have fitted it for the respective Uses and Purposes it was ordained for. The thickness and shortness of the Bones, with the intervening Cartilages, assisted by the bony Processes, dispose it to a Motion peculiar to it self. Whereas had the Bones been of any considerable length, upon bending the Body, the Articulations must have made a large Angle upon their inmost Edges, and the spinal Mar-

row have been continually liable to be injured ; or had the Cartilages been entirely wanting, it would have been as ufelefs as if it were but one Bone, whereby we being rendered incapable of bending the Trunk of the Body, it muft have always remained in an erect Pofture. But by the prefent Difpofition of its Parts, 'tis not only abfolutely fecured againft any fuch Inconveniencies, but, although fo fmall a Pillar as it is, is capable of fupporting, without Hazard, fuch prodigious Weights, as we are not wanting in our Accounts of.

Another Particular, which befpeaks the utmoft Wifdom and Defign in the Contrivance of this Part, is the remarkable Difference there is in the thicknefs of the Cartilages, placed betwixt the Bones of the Spine ; the *Vertebra* of the Breaft requiring but little Motion, the Cartilages are there but thin, in comparifon of thofe of the Loins, which being very thick, the loweft more efpecially, the Motion is there vastly greater ; and the Cartilages being abundantly thicker before than behind, this is the Reason that we bend our Bodies fo much more forward than backward. And by this admirable Method of difpofing of the thicker Parts of the Cartilages forward, it is, that in all violent Exercifes, the Parts contained in the Belly and Breaft are in a great meafure fecured from any Damages they might have been liable to, becaufe by the pliability and elasticity of thefe Cartilages, they break the violent Shocks the *Viscera* muft otherwife have neceffarily fuftain'd upon fuch Occafions.

From what I have here remarked, in relation to thefe peculiar Properties of the Cartilages placed between the Bones of the Spine, we may reasonably fuppoze them to be certain compreffible, dilatable, elaftick Bodies, which like other Bodies, endued with
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the same Qualities, will naturally yield to any incumbent Weight, which is sufficient to force the Particles of Matter of which they consist, into a more strict and close Union, and that when this compressive Power is removed, they will of themselves recover that State they enjoyed before they were obliged to give Way to that Pressure. Now I am here particularly to observe, that the lowest of all the Cartilages of the Loins, is the thickest, and so consequently that it contains a greater Quantity of Matter than any of the rest; by which means it becomes more disposed to have its thickness diminished, and that all of them gradually become thinner, even to the top of the Spine. Now all superiour Bodies, if they come to an immediate Contact, pressing upon their inferiour, it must necessarily follow, that the whole Weight of the Body, except the lower Limbs, must press upon and be sustained by the lowest *Vertebrae* and their Cartilages; but these Cartilages, as has been observed, being much thicker in this Part than the other, and the incumbent Weight bearing harder upon them, they must be unavoidably compress'd more than the other; and so, consequently, when this Weight is removed, their Expansion, from their natural Elasticity, will be greater also.

This being the natural State and Disposition of these Parts, during the whole space of Time we are usually employed about our necessary Avocations till we dispose our selves to Rest, the Cartilages of the Spine will, by their compressible and yielding Properties, become more close and compact from the perpendicular Pressure they sustain, and so consequently the Spine, the only support of the Trunk of the Body, will become shorter. But when this superiour Weight shall be entirely removed, by placing the Body in a horizontal Posture,

sture, as it always is when we are in Bed, the compress'd Cartilages will, by their natural elastick Power, begin gradually to enlarge themselves, till they recover the same expanded State they enjoyed before they were forced to give Way, and yield to the incumbent Pressure; and so consequently it will produce a considerable Alteration in a Person's Stature, agreeable to the determined Times mentioned in the preceding Letter. For if we only consider, that the before-mentioned compressive Power will lessen the thickness of all the Cartilages, in proportion to the Quantity of Matter they contain; and that there are usually reckoned about twenty four in Number, it will be no difficult Matter for us to apprehend, that their natural Expansion being recovered by our customary Repose, the Aggregate of the whole of the Expansions may amount to about an Inch. Now if the Alteration be so considerable as this, occasioned only by the bare incumbent Weight of the superiour Parts of the Body, without any additional Force applied to compress the Cartilages yet closer, how much more may we reasonably imagine it would be, were the Experiment tried on such Persons, whose usual Employment it is to carry heavy Burthens. I have only this one Particular farther to observe upon this Head, which is, that this Alteration is not to be expected to be the same in aged Persons as in those that are younger, because the Cartilages, as we advance in Years, gradually grow harder and harder, till many of them arrive to the solidity of a Bone; that is, by Degrees they lose their Spring or expansive Power, and at length continue in a compress'd State of Rest. And this is without doubt one principal Cause, why old People not only seem to have lost somewhat of their former Height, but are actually shorter.