

V. *Experiments to prove the Existence of a Fluid in the Nerves.* By Alexander Stuart, M. D. *Med. Regin. R. S. S. &c.*

THE Existence of a *Fluid* in the *Nerves* (commonly called the *Animal Spirits*) has been doubted of by many; and notwithstanding Experiments made by Ligatures upon the *Nerves*, &c. continues to be controverted by some. This induced me to make the following Experiments, which, I hope, may help to set that Doctrine, which is of so much Consequence in the Animal OEconomy, and Practice of Physick, in a clearer Light than I think it has hitherto appeared in.

E X P E R I M E N T I.

I suspended a Frog by the Fore Legs in a Frame, leaving the inferiour parts loose; then the Head being cut off with a Pair of Scissars, I made a slight Push perpendicularly downwards, upon the uppermost Extremity of the *Medulla Spinalis*, in the upper *Vertebra*, with the Button-end of the Probe, filed flat and smooth for that Purpose; by which all the inferiour Parts were instantaneously brought into the fullest and strongest Contraction; and this I repeated several times, on the same Frog, with equal Success; intermitting a few Seconds of Time between the Pushes, which, if repeated too quick, made the Contractions much slighter.

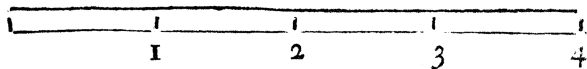
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E X P E R I M E N T II.

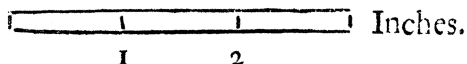
With the same flat Button-end of the Probe, I pushed slightly towards the Brain in the Head, upon that End of the *Medulla Oblongata* appearing in the occipital Hole of the Skull; upon which the Eyes were convulsed. This also I repeated several times, on the same Head, with the same Effect.

E X P E R I M E N T III.

I tied a Piece of fine Twine, or Thread, parallel to the crural Artery, Vein and Nerve of a Dog; and made a Ligature on them, and on the Parallel Twine, above and below, at the Distance of about four Inches; then I cut beyond the Ligatures above and below, so as to take out the Vessels and Nerve, together with the parallel Twine, in one Bundle; and laying them on a Board, both the Artery and Vein contracted immediately, and were shortned to almost one half of the natural Length which they had in the Body; to wit, to two Inches and a half; whereas the Nerve remained uncontracted, at its natural Length, and commensurated to the parallel Twine of four Inches, as before it was cut out of the Body, according to the annexed Figure.



The Nerve and Twine at their natural Length.



The Artery and Vein contracted.

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By which it appears that the Proportion of the Blood-Vessels in their compleatest Contraction, to themselves in a State of Extension, and to the Nerves at their constant and natural Length, is nearly as 5 to 8; or, which is the same thing, any given Section of a Blood-Vessel, cut out and left to itself, is capable of contracting, so as to lose $\frac{3}{8}$ Parts of its Length.

But though this Experiment may suffice for estimating the Elasticity of the Blood-Vessels in general, yet it is not to be doubted, but the Degree of their Strength and Elasticity may differ a little more or less in Animals of different Species, and Individuals of the same Species, nay even in the same Individual at different Stages of Life; but these Differences are not material to my present Purpose, which is only to shew, that the Nerves are not elastick, and that the Blood-Vessels are so to a very considerable Degree.

*I N F E R E N C E S from these E X P E -
R I M E N T S.*

The two first Experiments shew, that the Brain and Nerves contribute to muscular Motion, and that to a very high Degree.

The third Experiment makes it as plain, that what they contribute in muscular Motion, cannot arise from, or be owing to Elasticity, which they have not.

What remains therefore but to conclude, that the Action of the Nerves in muscular Motion, is owing to the Fluid they contain, by whatever Name we may choose to call it.

To fortify this Conclusion, let us consider, that we can have no other Evidence of the Existence of that
invisible

invisible Fluid the Air, and of its several Qualities of Elasticity and Gravity, but what arises from Experiments and Observations of its Effects; which are sufficiently satisfactory, and convince us of its Existence, though the minute Particles of its Composition fall under none of our Senses.

Therefore, in the same manner, seeing these Experiments put the Elasticity and elastick Vibrations of the Nerves quite out of the Question, I think we may as fairly conclude, that there is a Fluid in the Nerves, though invisible; as that there is such a Fluid called the Air, though it cannot be seen.

I shall only add, that though we may call this nervous Fluid by any Name, to which a proper, determined and fixed Idea is annexed, yet I think the Word (*Spirits*) was an unhappy Choice, as it includes an Idea either of something like to the Spirits of fermented Liquors, or some of the saline volatile Spirits, as that of *Hart's-horn*, &c. or a flying Vapour or Exhalation, all which being loose and indetermined, have serv'd only to mislead the Inquisitive, and amuse the Ignorant.

But the Source from which this Fluid ariseth, to wit, the circulating Blood; the Vessels through which it is secerned; and the Nerves in which it moves and is contained; the soft and almost insipid Taste, and no Smell observable in the Brain and Nerves, suggest no Idea of such Spirits: And the simple Qualities of a pure and perfectly defecated elementary Water, will better suit all that our Senses can discover of it, and are indeed sufficient to solve all the Phœnomena of the Animal OEconomy, as far as they depend upon the Nerves: which I hope to have an Opportunity of
explain-

explaining, in some of the most remarkable Animal Motions, some time hereafter, at greater Length than this present Occasion will admit of.

VI. *Observations of Latitude and Variation, taken on Board the Hartford, in her Passage from Java Head to St. Hellena, Anno Dom. 1737. Communicated by Edmund Halley, LL. D. Regius Astronomer at Greenwich.*

ON *Wednesday, February* the 2d, we took our Departure from *Java Head*, allowing it to lie in the Latitude of $6^{\circ} 45'$ South.

Monday, February 7.

By a good Amplitude made	$3^{\circ} 28'$	Variat. NWly.
Latitude by Account	9	59 South.
Merid. Dist. from <i>Java Head</i>	43	} West.
Longitude from ditto	45	

Sunday, February 13.

By a good Azimuth made	$4^{\circ} 45'$	Variat. NWly.
Latitude by good Observat.	13	43 South.
Merid. Dist. from <i>Java Head</i>	3	31
Longitude from ditto	3	36

Tuesday, February 15.

By a good Amplitude	$4^{\circ} 52'$	Variat. NWly.
Latitude per Observat.	15	18 South.
Merid. Dist. from <i>Java Head</i>	6	1
Longitude from ditto	6	9

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Monday,