

**EXPERIMENTAL
INVESTIGATION OF THE
ACTION OF MEDICINES**

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Experimental investigation of the action of medicines by T. Lauder Brunton

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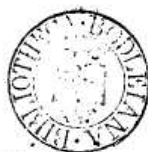
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OF THE
ACTION OF MEDICINES.

BY
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EXPERIMENTAL INVESTIGATION OF THE
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PART I.
CIRCULATION.

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EXPERIMENTAL INVESTIGATION OF THE ACTION OF MEDICINES.

I.—THE STANDARD OF HEALTH.

Modes of Investigation.—Pathology.—Pharmacology.—Life.—Conditions of Health and Disease.—Effect of Drugs.—Direct and Indirect Action.—Local and Remote Action.—Dose.—Modification of Dose.—Cumulative Action.—Effect of Habit, Climate, Fasting.—Form of Administration.—Effect of Large and Small Doses.—Homoeopathy.—Constitution and Idiosyncrasy.—Explanation of these from Experiments on Animals.—Connection of Chemical Constitution and Physiological Action.

GENTLEMEN,—The usual mode of investigating the action of a remedy is to give it to a patient during an illness and observe what changes occur in the symptoms after its administration. But it not unfrequently happens that medicines are given without any distinct change in the symptoms ensuing; and, even when one does take place, we very often cannot be sure that it is due to the medicine, and not to the course of the disease or some other modifying cause. For, if the remedy and the disease are both at work together, it is obviously impossible for us to decide what part of the result is due to the one and what part to the other, if we neither know what the course of the disease would have been had the medicine been given, nor what action the medicine would have had if the disease had not been present. Any attempt to investigate the action of a remedy by giving it under such circumstances is like that of a rifleman to learn shooting by practising only at dusk, when he cannot see the butt, much less the bull's eye. He might go on practising for ever in this way without making any improvement; for, when he missed, he would never know whether it was because he had not seen the mark properly or had not aimed steadily at it. If he wish to learn, he must practise by daylight, when he can clearly see the mark, and can thus be sure that every miss is due to unsteady aim. He will fire high or low, to one side or the other, as he finds neces-

sary, and, by gradually correcting every error, his aim will at last be sure. Should he then be called on to stand sentry on some dark night, and shoot at some suspicious object without hitting it, he would know that his failure was due to his not having seen the object distinctly, and having consequently aimed in a wrong direction. And just as the rifleman, before he stands sentry in the dark, must learn to shoot by daylight, when he can note the effect of each alteration in the position of his rifle on the course of the bullet, so ought we to investigate the action of our remedies in circumstances and under conditions which we know and can vary at will, marking the effect of each variation upon their action till we thoroughly and exactly understand what it is, before we proceed to give them in disease, when not only the conditions under which they operate are at present in a great measure unknown, but the effects they produce cannot be definitely ascertained from insufficient knowledge of what the result would have been had they been withheld. Of late years, it is true, vigorous efforts have been made to determine what course diseases run when not interfered with by medicines; and, although it is often difficult to say what the sequence of symptoms will be in any particular case, depending as it does not only on the general course of the disease, but on individual peculiarities of the patient and on the varying circumstances in which he is placed, we may nevertheless ascertain with tolerable accuracy whether or not our treatment is beneficial in a general way, even when we cannot determine its effects in detail.

Very inexact and very unsatisfactory as such a knowledge of medicines as this necessarily is, it must for the present be our guide in practice in a large number of instances; and our treatment at present and for some time to come will be chiefly empirical, because our knowledge of pharmacology, and perhaps still more of pathology, is not yet sufficiently advanced. For there is hardly any disease in which we know the exact nature of the morbid changes which are occurring, or the precise organs or tissues which are their seats; and, with some exceptions, we are but very imperfectly acquainted with the structures on which our remedies act, and the exact mode in which these are affected by them. Day by day, however, our ignorance is diminishing; and we may hope that ere long rational treatment will to a great extent supersede blind empiricism. It not unfrequently happens at present that we meet with a case which bears a very close resemblance to others which we have treated successfully, and which nevertheless obstinately resists the remedies which we had previously found ser-

viceable. Our failure astonishes and vexes us; but we are ignorant of its cause, and we can only select some other drug by guess and try it; we cannot at once choose the one which will have the desired effect.

PATHOLOGY.—In order to choose a drug which will have the effect that we desire to obtain, we must know where the morbid changes are taking place, and what their nature is; and we must be sure that our medicine will act on the affected part, and in such a way as to counteract the disease. We must trace every symptom which we see, back to its unseen source; every flush on the cheek, every quickening of the pulse, back to the vaso-motor or cardiac nerves, which have allowed the capillaries to become dilated, and thus produced the redness, or have permitted the heart to beat more rapidly than its wont. We must then inquire what has produced this alteration in the nervous system, and so on, till at last we discover, if possible, the hidden cause of the mischief. We will then give that remedy which will act in the proper way on the part which we believe to be the seat of the morbid process; and, if the expected result does not ensue, we shall, at any rate, have discovered what the pathology of the disease is not; and, by trying a remedy which will act in a different way or on a different structure, we may find out what it really is.

When I speak of the pathology of a disease, I do not mean those obvious alterations in the structure of an organ which we meet with in *post mortem* examinations, but the so-called functional changes which precede and are the cause of both them and the symptoms. For example, the disorganisation of a man's liver by the presence of an abscess, or of his kidneys by fatty degeneration, is not the disease from which he suffered, any more than a field strewn with slain or crowded with heaps of wounded is a battle. The disease was the alteration in the nervous and vascular systems, and in the nutrition of tissues, which we call the inflammatory process, and which produced the abscess and degeneration, and the disturbance of the same systems to which these lesions in their turn give rise; just as an army may not only lose the battle for want of the assistance which its slain and wounded would have given, but its retreat may be embarrassed by their presence.

The insufficiency of present modes of treatment, and the urgent necessity which exists for an accurate knowledge of pathology and pharmacology, are shown by the manner in which any new remedy is seized upon and applied in all sorts of cases, even in those where a knowledge of the morbid processes going on, and of the action of the remedy itself would at once have indicated that harm, and not benefit,