

must be deferred until later, when all the inferences shall have been verified or disproved. For further investigation of the comparative anatomy, I have two fishes with normal eyes and the complete series of the flounder, including all the changes in position from the beginning to the completion of the wandering. In birds, I have also two species with normal eyes, and the owl as the aberrant type. In mammals, I have the hare, skunk, pig, dog, cat, lemur and man—of the latter embryo and adult specimens. This material will be supplemented by investigations on normal individuals in order to obtain the grosser refraction errors and the muscle status.

I shall be grateful for any criticisms or suggestion regarding the ideas advanced in this article or in the methods to be followed, and I shall take pleasure in replying to and in acknowledging such communications.

SOME ASPECTS OF SCIENCE AND FALLACY AS THEY RELATE TO MEDICINE.*

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"Faith, fanatic Faith, once wedded fast
To some dear falsehood, hugs it to the last."

In the preparation of this paper I have had in view several motives. First, to emphasize the fact that the practice of medicine consists simply in the intelligent application of common-sense principles and forces. It has nothing of the mysterious and supernatural about it. The further one gets from common sense the further he gets from scientific medicine.

Second, to call general attention to the value and to the dangers of that force which we call "suggestion." For, while the forces of nature intelligently employed may result in great good, wrongly employed they are equally as potent for harm. Take whatever force or power you will and reason out the principle; see if these powers wrongly used are not equally as dangerous as they are beneficent when rightly used. Merely for illustration, I will mention fire, water, powder, dynamite, steam and electricity. Anything incapable of doing harm is also incapable of doing good. To argue, then, that anything may do good should suggest that it may do harm. Yet many people seem to think (and it is because they are ignorant of the forces) that they can try with impunity any quack remedy. We see the results often when it would not be humane to the victim to relate the consequences.

Third, I wish to call attention to the danger of drawing deductions from imperfect knowledge or when unfitted by education or training to discriminate. As the same end is at times obtained by widely different means, the question is suggested, what, then, is the force or what are the forces giving rise to the results? These are usually the curative power of nature; in some, nature plus suggestion, etc. On the other hand, in many instances, there is self-deception. Just as in consumption the sufferer often fancies he is improving, so thousands of certificates of cure have been obtained from the diseased whose troubles were never delayed and who never received the slightest benefit from the treatment. They are like "Sir William Edward Peary and his party, who were going straight towards the pole in one of their Arctic expeditions, traveling at the rate of 10

miles a day, while the ice over which they were traveling was drifting straight to the equator at the rate of 12 miles a day, and yet no man among them would have known that he was traveling 2 miles a day backward unless he had lifted his eyes from the track in which he was plodding."¹

"The science of medicine had its birth in necessity."² It has materially lengthened the average duration of human life, and rendered worth living the lives of countless thousands. It has reached a point in its development where its claims as a science are generally acknowledged. Yet, as from primeval times to the present, fallacies have so often been exploited as infallible cures, I think an analysis of some of them may prove interesting. With each changing cycle some new error is born, to be in turn clasped to the bosom of those "who follow the lead of their emotions" rather than the dictates of common sense and, as Gould states, "the emotions are good incentives, but poor guides."

Four hundred years before the birth of Christ, Hippocrates wrote: "Life is short and the art long; the occasion fleeting; experience fallacious and judgment difficult." Though the truth of this aphorism, which has come down to us through the centuries, is fully appreciated by the thoughtful physician and is as true now as when written, it is really wonderful to note, even in this advanced age, the ease with which so many people succumb to "fallacy" and, finding a sprig of truth, at once mistake it for the whole tree, trunk, roots and branches, and attempt thus to make the part greater than the whole. The scientific physician is neither the slave of custom nor the victim of circumstance. In the pursuit of his calling, he brings to his aid many forces the logical application of which tends to alleviate human suffering and to dissipate disease. Wedded to no creed, handicapped by no narrow dogmas, above the plane of blinding prejudice, he toils on, bringing to bear on the case in hand whatever force or forces reason and wisdom have shown to be of value. Even with this, "it takes half a lifetime to learn how not to make useless mistakes." (Gould.)

In regard to the many panaceas that have at times claimed the attention of the public (besides the curative power of nature, which many seem never to have considered), one dominant force pervades them all. A force which has been used and utilized from the days of Hippocrates to the present time. A force which has been used ignorantly by the untrained, who never appreciated its character, its source, its powers or its limitations. It runs like a thread through every method of treatment, wise or otherwise. It is this force and nature which give a life-history to every new form of treatment, however absurd it may be. I refer to the power of "suggestion," now vulgarly known as the "mind cure." Its use is as old as history, but it is a force hardly yet fully appreciated by some and by others employed to a degree beyond the warrant of reason. "The earliest practitioners of medicine concerning whom we have any authentic information were the *Æsclepidæ*, or priest-physicians, who endeavored to cure the sick partly by superstitious modes of working on the imagination" (mind cure), "and partly by more rational means, suggested by observation and a patient study of the phenomena of disease."² That "suggestion" is a power for good in suitable cases every physician knows; that it is also a power for evil the many wrecks of Christian

* President's address, read before the Middle Tennessee Medical Association, 1904.

1. Holmes: "Currents and Counter Currents."

2. Adams: "Life of Hippocrates."

science and like methods of treatment abundantly attest. The desirability at all times of a proper mental attitude is suggested in the legend of "Pandora's Box." She unfortunately turned loose on the world all the evils therein contained, but shut the box just in time to prevent the escape of "Hope." The good effect of mental measures has been recognized for centuries, not only for its influence on the body but its influence on morals as well. For instance, in Philippians, fourth chapter and eighth verse, the advice is given, "whatsoever things are true, whatsoever things are pure," etc., "think on these things." Suggestion is the secret power of the mother's kiss, which so quickly dissipates the pain of the minor bumps and bruises of childhood. It is the same power, acting through the lullaby of the nursery, that so quickly sends the child to the land of peaceful sleep. Songs often used for the same purpose gain by repetition in suggestive value. I suppose we have all been struck by the monotonous character of these songs. This serves a distinct purpose; the monotony of rhythmical sound through its influence on the brain enhances the sleep-producing power of suggestion.

These things all point to the influence of "suggestion," which I shall define as we usually attempt to use it in the treatment of disease, that influence which incites in the mental makeup hope, confidence, effort, determination, expectation or belief. This is usually accomplished through "assertion," repeated and re-enforced in every possible way. The forms of suggestion are many and the object aimed at generally suggests the method. At times almost any change in the mental state will accomplish the desired result. The main object is to change the whole current of thought from a morbid to a wholesome nature. Now, strange as this may seem from a casual examination of this form of force, it is a power that may be abused and may result in great and even in lasting harm. Carried to extremes, it leads to neurasthenia and to other forms of nervous unbalance. "But wise men have long ago come to the conclusion that truth does not dwell with extremes."³ Imagine, for instance, the absurdity of the Christian scientists in denying the existence of pain and of disease of which their followers are constantly dying. Does this not prove mental unbalance? Yet who would deny that the "mind cure" in trained hands has its mission in therapeutics? "Mind cure, so-called (says Mitchell), has in some shape its legitimate sphere in men who know their profession." Further, he states, "I can not leave this subject without a further word of solemn warning. In my youth we had mesmerism with its cures, then we had and have spiritualism with its like pretensions. From time to time we have had faith-cures. They come and they go and have no stable life. The evil they do lives after them in the many mental wrecks they leave. When the charlatan, Newton, was ordering every class of sick to get well, I was called on to see case after case of the most calamitous results on mind and body. Now and then he had the luck to meet some one who was merely 'idea-sick,' a class we know well. Then he made a cure which would have been as easy to me as to him. I made much inquiry, but could never find a case of organic disease with distinct tissue changes which he had cured. A man with hopeless rheumatic alterations of joints was made to walk a few steps without crutches. This he did at sore cost of pain, and then came to me to tell his tale,

with a new set of crutches, the healer having kept the old set as evidence of the cure. And now we have the mind cure, Eddyism and the like, a muddle of mystical statements, backed by a medley of the many half-examined facts which show the influence of mental and moral states over certain forms of disorder."⁴ Mitchell states the case well; while it has its place in the hands of those "who know their profession," its attempted use by others frequently ends in disaster.

Goodell states in his article on "Nerve Counterfeits": "I know of another sofa-ridden lady of wealth who for many years had been treated by some of our best gynecologists. She was put on her feet and made well by a family quarrel resulting in a prolonged lawsuit. These are the cases which are so constantly being cured by mesmerists and itinerants, by faith and by pilgrimages." Archibald Church⁵ states: "Suggestion, however, is a mighty aid to the physician, and without producing hypnosis positive and intelligent assertion can accomplish all that is likely to be done by hypnotism short of the somnambulistic stage. A fair realization of the part suggestion plays in therapeutics is one of the recent achievements of the most progressive medical minds." Again: "No scheme of treatment in neurasthenia is complete that ignores the mental element of the disorder." Again: "Recognizing in hysteria a mental disturbance principally, the treatment must be psychic. Methods are usually successful in proportion as they are novel to the patient, strike the fancy and stimulate the imagination."

Charlatans recognize this, hence the peculiar garb they affect; their long hair and the many other ruses practiced, seeking thus the aid of suggestion. So, it may be noted, "suggestion" is practiced in different ways. To the old question, "What's in a name?" I would answer, "Much." The quack appreciates this, and so his medicine is given some Indian or other uncommon name, the more suggestive of mystery the better. None of us are entirely free from superstition and, to some extent, such things appeal to us all.

To be a little more specific, I will briefly mention a few of the remedies that have been brought forward and that have at times achieved great reputation. First, the "weapon ointment."⁶ This ointment was applied not to the wound but to the weapon that caused the wound. At one time it had great reputation and contained substances addressed specifically to the imaginations, as portions of mummy, of human blood, of "moss from the skull of a thief hung in chains." The wound was washed and bandaged and the ointment applied to the weapon. So here we get the advantage of the healing power of nature and suggestion. I will merely allude to the "royal touch" for "King's Evil" (scrofula), in vogue in England from the time of Edward the Confessor to that of Queen Anne. Besides touching the patient, a gold piece was ordinarily hung about the patient's neck. From this treatment (nature and suggestion), many immediate cures were reported. "Indeed, according to the statements of the advocates and contemporaries of this remedy, none ever failed of receiving benefit unless their little faith and credulity starved their merits. Some are said to have been cured immediately on the very touch, others did not so easily get rid of their swellings, until they were touched a second

4. Mitchell: "Doctor and Patient."

5. Nervous Diseases.

6. I am indebted to Holmes' Essays (Homeopathy and Kindred Delusions), for my accounts of the "Weapon Ointment," "Royal Touch" and "King's Tractors," some of which is taken verbatim.

3. Gould: "Borderland Studies."

time. Several cases are related of persons who had been blind for several weeks and months and obliged even to be led to Whitehall, yet recovered their sight immediately on being touched, so as to walk away without any guides." So widely was this fallacy believed that in the course of 12 years nearly a hundred thousand persons were touched by Charles the Second.

While this seems strange to us, stranger things are believed even in this age of enlightenment. Nature and suggestion were here the only possible forces. Of course, among many such cases and others to be mentioned there were many untimely deaths and much useless suffering. It reminds one of a man struggling in the water while senseless friends, instead of throwing him a rope, only encourage him with their shouts. The encouragement is good enough as far as it goes, but it needs to be supplemented. Of course babies, except in the lines indicated and those with clouded brains, as from fevers, could not possibly receive benefit from suggestion, and nature was then the sole dependence. While in ordinary diseases "suggestion" may or may not be of benefit, its field of great usefulness is in cases of disease more imagined than real. Those who are "idea-sick," or who suffer from "dream pains," and are frequently relieved by a hypodermic of water and, strange to say, there are others in whom opiates pushed to the limits of safety have no apparent control over the pain (?). These cases sometimes deceive for a time the most astute physicians, and we all know that in many instances of a supposed illness or rather when the disorder is entirely or principally mental, it is not prudent or wise to so inform the patient or the family; sometimes because we would not be believed, or because it would sacrifice the friendship of the patient or the family, or because it would uselessly mortify the patient, for she, too, is often deceived and intends no deception. Often to tell the patient would be to exaggerate the condition and defeat the plan of cure. It is possible that in these cases a future pathology may reveal some abnormality in the chemistry of the secretions.

The success of any given treatment is merely a matter of percentage. Cases of pneumonia, of typhoid fever, of consumption, etc., not infrequently recover without the aid of medicine or anything else except nature, but who in his right mind would be willing to pass through such an illness without the aid of a skillful physician, for his chances of recovery are then correspondingly enhanced?

"King's tractors" consisted of two pieces of metal, iron and brass. These were laid on the patient and were supposed to exert great healing power. Their period of popularity was from 1796 to 1811, and during that time 1,500,000 people in Great Britain alone were supposed (according to their publications) to have been cured by them. Nature and suggestion here could have been the only aids. But think of the useless suffering and sacrifice of life that must have occurred among those who were foolish enough to risk such a folly. The originator of these was a shrewd Yankee, who became rich from the credulity of the people. Clergymen were frequently given a pair along with the receipt of the usual cost price, five guineas. Many testimonials set forth the wonderful powers and virtues of these worthless objects and physicians were bitterly denounced for their skepticism. Even when physicians made imitations of wood and obtained the same results the storm of indignation against them was not allayed.

At this day it might be possible to find a pair among the collection of curios of some medical man along with Mrs. Eddy's book, works on osteopathy, the electropoise, and other such things that are of peculiar psychologic interest to many of us.

Strange to relate, clergymen and religious bodies are usually first approached by such people and have proved the most credulous. Religion, unfortunately, has so often lent its influence to charlatans, or been designedly used by them, that medical men look askance at the man who mixes medicine and religion too freely. Religion should be a thing entirely apart from the practice of medicine and those who cherish its ideals should jealously guard it from the sordid, who would use it as a cloak for ulterior purposes. In reading the history of fake cures, one notes with a feeling of regret the number of certificates of clergymen as compared to those of other people. So marked has this been that it has long been a matter of general comment. They have been trapped into this by noting recoveries from real or apparent diseases and have gone no deeper into the matter than "*post hoc ergo propter hoc*." Their intentions are good, but the evil they do is enhanced on account of their prominence.

Homeopathy, which Holmes said consisted of "sugar of milk and a nomenclature," has changed much of recent years. The most advanced homeopaths of to-day differ from us (in the practice of medicine) only in name. Most of them have now renounced the laws of Hahnemann and there is really no longer any excuse for the separate existence of the schools.⁷ Many of their most successful practitioners and teachers use the same text-books and have simply changed their signs.

Of course, as a curiosity, one occasionally sees a true homeopath, but Mrs. Eddy boasts that Eddyism has practically usurped his place. As a matter of fact, the only advantage the strict homeopath had over Mrs. Eddy in the treatment was in diet and hygiene and in not trying to urge patients to that mental attitude which if completely attained must mean insanity—for no sane person could accept and believe such utter foolishness as Mrs. Eddy teaches. The Eddyites deny the existence of disease and when one is ill claim that he is not sick but only thinks so. They say that there is no such thing as poison, but that strychnin, arsenic, etc., become poisons just because they are thought to be so. This sometimes leads to rather confusing results. The following story from Mark Twain illustrates this point: "A certain mule was being fed on popcorn, when his well-stored crib caught fire. The heat caused the corn to pop, and as it fell back on him the mule, thinking he was in a snowstorm, froze to death." This, without any exaggeration, is a fair sample of Christian science logic. It reminds me of the comment of the *Medical Record* on a new form of treatment just being advocated, which was specially ludicrous. The *Medical Record* stated that the fellow would get rich if he could "keep his face straight long enough."

Mrs. Eddy, Dowie, and the fellow who gives absent treatment all seek the same end with somewhat different methods. To quote a lay writer and student of such methods. "Each of the indefinite number of sects of mental healers now in evidence in this country tells us that it has a law of its own, and that it is the only genuine article, all the others being only feeble imitations or wholly fraudulent, wicked and diabolical. They

7. Quine: "Reasons I Am Not a Homeopath." *JOURNAL A. M. A.* April 29, 1899.

agree in but one thing and that is in hating the medical profession; and they hate but one thing more than they do that profession and that is each other."

Manipulations and movements are forms of force long used by the medical profession or under their direction. They are but branches of the tree of medical science and have their legitimate place as therapeutic agents. They also have their dangers, as is well known to medical men, yet the osteopaths have now brought these forward as cures for all ills. From them one gets the benefit, if benefit follows, of three forces, namely, nature, massage (and medicogymnastics) and suggestion. Cowling used to say: "Massage is a very good thing for a lazy man." This indicates partly its sphere of usefulness, but it is (rightly used) a power for much good in suitable cases. It is of real and decided value in quite a number of chronic diseases, but no osteopath, with his meager training, is able properly to select the cases. Some of their egregious blunders have come under my observation, and they would have been ludicrous had they not been so serious. The graduates in massage and Swedish movements are far more thoroughly trained than are the osteopaths and, in addition, they are not falsely taught.⁸

I would like, did time permit, to go a little further into these subjects, as well as to discuss other such methods in vogue in the treatment of disease. Many of them, as well as some I have mentioned, in many instances serve only to subvert the attention of the patient, while nature does, or fails to do, the work.

I would have no one think that any regular physician considers medicine a complete science. It is far from it. Neither would I have one think we are not cognizant of our many deficiencies. The very purpose of this association and of other similar bodies is to overcome these defects as far as possible. Even with these aids and added years of study and experience we can never even hope to perfect ourselves in this most difficult field of human endeavor.

THE X-RAY TREATMENT OF MALIGNANT GROWTHS.*

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I began x-ray work as a skeptic, doubting the therapeutic value of the ray. After giving my first case of epithelioma six exposures and seeing the scab become thicker, I advised the patient to have the growth excised. This was done and I examined the tissue microscopically and was impressed with the decided retrogressive changes observed in the carcinomatous cells. The next epithelioma I treated with more confidence, and after six weeks' treatment it had healed.

The results of the practical use of the ray as reported by different operators have varied greatly. The general profession has been misled by the over-enthusiastic as well as by the pessimistic operators, so that the true value of the ray has yet to be demonstrated. It is not a magic light that will heal every malignant growth to which it is applied, nor should it be placed on the shelf with other discarded therapeutic agents. It is a natural force of great variation, having a decided influence on living organic matter.

The microscopic changes in the tissues which have been exposed to the x-ray have been studied and reported by many observers, and their observations, in general, agree. It is these observations which should give us the basis for the possibilities and limitations of the ray.

To determine the value of the ray as a therapeutic agent, we have to consider first the factors concerned in the production and variation of the x-ray and the methods of the application in treatment; second, the histologic changes due to the x-ray, and third, the nature and location of the growth to be treated.

The x-ray is capable of wide variation, both in its penetrating quality and in its intensity or effective energy. Among the variable factors which have to be considered in each treatment are the voltage and amperage of the current supplied to the primary, the number of interruptions made by the interrupter, the resistance in the secondary circuit represented by the number of spark gaps in series, and the degree of vacuum of the tube, the distance of the tube from the surface to be exposed, and the duration and frequency of the exposures. The successful application of the ray is dependent on the proper co-ordination of these factors for each individual case.

Until recently, there was no way to measure the energy given off from a tube. This could only be approximated by one's experience with his individual apparatus or may even increase the vitality of the less differentiated tissue and enables one to measure the dosage with a fair degree of accuracy. The technic is being steadily improved by experience and the proper appreciation of the physical laws governing the ray, especially that the intensity varies inversely as the square of the distance.

With so many variable factors to be considered in the proper application of the ray, there is no wonder that the therapeutic results of different operators have been so inconstant.

According to the effective energy given off from a tube, there are decided changes in the tissues as revealed by microscopic examination; cells are affected and undergo atrophy, or granular degeneration. The nuclei stain feebly, become swollen, vacuolated and disappear or break into fragments. The cells swell, lose their outlines, become granular and disintegrate. These changes are especially noticeable in the cells of the glands, hair follicles, the skin and those lining the blood vessels, but to a less extent in the cells and fibers of muscles and connective tissues. The effects on these latter may be secondary, dependent on the inflammatory process resulting from the death of the cellular elements. There is more or less round-cell infiltration depending on the degree of reaction. The ray may stimulate or may even increase the vitality of the less differentiated tissues.

From these observations, it is evident that the elements of the tissues which are most affected by the ray are the cells and in the proportion that they exhibit the manifestations of life. Dead organic matter is not influenced by the ray. Another evidence that the ray acts on the vitality or life of a cell is the fact that a tissue, immediately after a destructive exposure to the ray, shows no macroscopic or microscopic change and it is only after the lapse of several days that the changes consequent on the death of the cells begin to appear. We would conclude, therefore, that the tissues most influenced by the ray are those having a large proportion

⁸ Jakob Bolin: JOURNAL A. M. A., April 6, 1901.

* Read by invitation before the College of Physicians, Philadelphia.