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Part I.—Original Articles.

Temperament. By HENRY RAYNER.

TEMPERAMENT, derived from "*tempero*," owed its meaning to the supposed mingling of the "humours," the sanguineous, the bilious, the phlegmatic and the melancholic, the predominance of any one of these in an individual giving rise to the characters of the corresponding temperament.

In current English the word is used to indicate indefinite qualities and characteristics, such as the "artistic," having no relation to the original signification. The inheritance of defective self-control of temper has been described as temperament.

In mediæval English the word "humour" was employed in the sense of temperament, and was perverted to an even greater extent, being applied to oddities, whims, tricks, aptitudes, apings, and ultimately to almost anything. Shakespeare ridiculed this abuse of the word by making Corporal Nym use it in many meaningless ways, such as "I love not the humour of bread and cheese, and that's the humour of it."

Temperament held such an important position in medical literature from Galen down to comparatively recent times, that the neglect into which it has fallen cannot but excite astonishment. So great is the medical desuetude that in *Allbutt's System of Medicine* the word "temperament" does not occur in the index, and in the latest *Cyclopædia of Medicine* the subject receives attention to the extent of eight lines only. The *Encyclopædia Britannica* gives it no separate heading. The *Index Medicus* in recent years often contains no references, and the few that occur are usually relative to the "artistic" and similar so-called temperaments having no connection with the subject.

The Catalogue of the Surgeon-General at Washington, however,

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contains several columns of books on temperaments, chiefly of remote dates, the most recent being that of Stewart, published in 1886.

This medical neglect of temperaments after so many centuries of prominence is not easy to explain. They have certainly not ceased to exist, for they have received considerable attention in other branches of science, as a brief review of the views of various writers will demonstrate.

Medico-psychologists, for example, have given some attention to the subject, but this is usually confined to a description, without any attempt at practical application in treatment or prognosis. Maudsley, in writing of temperament and idiosyncrasy, says: "Unfortunately these big words are at present little better than cloaks to ignorance; they are symbols representing unknown quantities rather than words denoting definite conditions." He continues: "No more useful work could be undertaken in psychology than a patient and scientific study of individuals—the scientific and accurate classification of the minds and characters of particular men in connection with their features and habits of body. How vast a service it would indeed be to have set forth in formal exposition the steps of the quick process by which the shrewd and experienced man of the world intuitively judges the characters of those he has to do with, and refers them in a moment, instinctively, to their proper classes in his mind."

Richerand also writes: "I have no doubt that the influence of the physical organisation on the intellectual faculties is so decided that we may regard as possible the solution of the following problem. The physical man being given, to determine the character, the extent of his capacity and to assign consequently not only the talents he possesses, but those he would be capable of acquiring."

This demand certainly exceeds all that could result from a complete study of temperaments, for he includes innate endowment and education as well as character. These quotations show that serious thinkers recognise that considerable possibilities might result from a better understanding of the subject.

Psychologists have given an immense extension to temperament. Dr. Ludwig Georg (*Lehrbuch d. Psychologie*, Berlin) ascribes it "to the nature of the internal relation which exists between perception and the affections of the mind." It is not easy to understand how this description meets all the demands that he puts on it. He asserts that nations are distinguished by temperament, *e.g.*, the French are sanguine, the English melancholic, the Spanish choleric, and the German phlegmatic. Still further, the Caucasian is sanguine, the Mongolian melancholic, the Negro phlegmatic, and the Malayan choleric.

He even describes the four periods of life as being characterised by the four temperaments and extends them to the animal kingdom generally.

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Wundt agrees with Georg in recognising temperaments in orders, families, and species of animals as well as in human races and nations. He gives prominence to the emotional characteristics.

Lotze's conception of temperament is connected with the differences of excitability for external impressions, the excitability and variability of ideas, and the strength of their association with pleasure and pain. He therefore bases temperaments largely on the mental characteristics, together with nervous reaction.

Comte dwelt specially on the psychical activity as shown in the habitual predominance of thought, feeling, or action in the individual.

Perez made movements the distinctive evidence of temperament, as these were lively, eager, or slow, thus making the motor reflex to stimulation the basis of his views.

Ladd points out the incongruities of these psychologic views and the difficulty of reconciling them. He adds that "of the exact nature of the physical basis of temperament nothing is known." He draws attention to the generally recognised fact that the abnormal bodily conditions of certain diseases produce alteration of personal characteristics resembling temperament, and that this seems to indicate that the "original constitution of the brain" is not the principal determining factor. He concludes that "the habitual condition of the internal and visceral organs and the colouring they impart to common feeling seem to be of prime importance in determining temperament."

The current view of the basis of temperament throughout the ages has obviously varied with the prevailing physiological and pathological theories, from the "humoral" period to the apotheosis of the brain cell of the present day. Hence it is not surprising that Sir Robert Armstrong-Jones, one of the most recent and able writers on the subject, asserts that temperament originates in the "master structure of the brain" —presumably the cortex cerebri.

The latest psychological writer on temperaments (James Ward, in *Psychological Principles*, 1918) says "that when we talk of a man's moods we are talking of concrete facts; when we talk of his temperament we are using a vague and rather empty generalisation." He suggests that they may be interpreted in the light of cœnæsthesia as determined by physical circumstances or by health, or both, and restricted in their range by the constitution of the organism itself. He is inclined to place temperaments in the "Anlage" of the brain, putting them almost on the level of sex. He would seem to admit that they are dependent finally on the physical constitution of the organism.

These widely varying views of temperament differ not only in the mental, emotional, and neurotic bases that they ascribe to temperament, but also by including the results of education and experience in the form of character, which are not temperamental.

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Definition.—The need of some agreement in regard to the meaning of the word is obvious when such learned authorities differ so widely in their interpretation.

Definitions of temperament are comparatively rare in the literature of the subject, but the most satisfactory are those of two of the clearest thinkers of recent times—Dr. Laycock and Jonathan Hutchinson.

Dr. Laycock defined temperament as "the fundamental modes of vital activity peculiar to the individual," and Hutchinson, in his *Pedigree of Disease*, described it as "the sum of the physical peculiarities of an individual, exclusive of all tendencies to disease," and he elsewhere adds "that it concerns the original inherited organisation of the individual," and does not include anything which is the result of the influences to which life has exposed him.

The use of the word "peculiar" is unsatisfactory when applied to characteristics common to the large classes of individuals manifesting a temperament, and "physical peculiarities" is misleading, since it might be made to apply to hare-lip and similar defects and deformities.

Exception may also be taken to "inherited organisation," which might be read to imply that temperament was always inherited, which is certainly not the case, since the children of parents with marked temperament may be of neutral temperament, and on the other hand, parents of neutral may produce children of marked temperament, and children possessing two or three different temperaments may be born to the same parents.

These definitions may be re-phrased as meaning that "temperament is the normal fundamental mode of vital activity of an individual, in nutrition and function, as manifested at birth, quite apart from all post-natal influences, and not necessarily due to inheritance."

This definition excludes—

(1) Tendencies to special nutritional disorders, *i.e.* diatheses, such as gout, rheumatism, etc.

(2) Innate tendencies to functional disorders such as neuroses and psychoses.

(3) Capabilities or aptitudes such as an ear for music, an eye for colour or form, or a turn for mathematics. These are not temperamental, since they may occur with any temperament, are certainly innate, and are probably dependent on brain structure, showing themselves as the sensory and mental development of the individual advances.

(4) "Moods," the daily and hourly variations of "how we feel" due to the temporary changes of the cœnæsthesia from the circumstances of the hour, are also excluded by this definition of temperament. These occur in persons of all temperaments and are closely allied to temperament, so much so that within the limits of normality they might be described as "temporary" temperaments, but they must be

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distinguished from "moodinesses" often classed with them, which are of abnormal origin, being due to disorder of some special organ—the brain, liver, stomach, heart, etc.—or to mental habit and not to the cœnæsthesia of the hour.

(5) Peculiarities of reaction—

(*a*) To special substances, as seen in anaphylaxis, idiosyncrasy, intolerance and tolerance of drugs, etc.

(*b*) To sensory and mental stimuli (antipathies), as to the sight of an animal or thing, particular sounds, certain odours or tastes, or to certain sensations of touch. It is necessary to distinguish true antipathy in taste from idiosyncrasies, sometimes described as antipathies. In the latter certain articles of food, even if eaten unknowingly, produce very violent nutritional disturbance, in the former, although the taste is most antipathetic, yet if the food is taken unknowingly there is no special result.

(6) Character is excluded, although a large number of writers make the mistake of including it. Temperament and character are in many cases in opposition, and indeed may be said to be always antagonistic. Education, training and experience, which go to the formation of character, gradually overcome the too easily excited reactions of the sanguine or quicken the tardy reactivity of the phlegmatic.

(7) The most important exclusion, the melancholic diathesis, requires some special mention, since it was described as a temperament depending on the secretion of black bile by the spleen, but after the discovery of this error its place has been taken by the nervous diathesis. This has been very variously described so as to appear as a mingling of the true melancholic with the "insane" and the "nervous" diathesis. The insane diathesis I have described in Hack Tuke's *Dictionary of Psychological Medicine*, and the true nervous diathesis appears to me to still await accurate definition and description, possibly in one or more divisions.

Persons of the melancholic diathesis are slightly built though often above the average height, their foreheads often high but narrow rather than broad; they are usually darkly pigmented in hair, eyes and skin, the hair being fine and plentiful but not curling, tending early to greyness; the teeth also usually tend to early decay. They are usually thin, even, as Clouston observed, at periods of life when it is physiological to be fat. Their dentition and other developmental growth is apt to be irregular. Their reaction to stimuli is rapid and they are usually active and restless. Their mental activity is great and often carried to exhaustion, so that periods of rest follow, often with emotional depression.

When these alternations of activity and depression are extreme in men of considerable talent it not infrequently becomes actual melancholia.

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From the slightness of their build it has been suggested that their chylo-poietic viscera were of defective development. Whether this is so or not, they often suffer from defective digestion and its consequences. It has often appeared to me that their assimilative powers were unequal to meet the great demands of their physical or mental activities. Other members of their family often suffer from tuberculosis—an evidence of defective powers of resistance, which also might be ascribed to assimilative defect.

(8) Idiosyncrasy has always been regarded as so closely allied to temperament that a more special mention may be made of it without making too wide a digression. The recent studies of anaphylaxis appear to solve satisfactorily the problems of idiosyncrasy, which to Maudsley and others were still enigmas.

Anaphylaxis is induced by the injection of a definitive albuminoid (colloid) into an animal (alimentary ingestion is also possible), and after the lapse of a definite period the repetition of the injection produces a greatly increased intensity of reaction, the symptoms of the reaction being those of an acute intoxication of the nervous system. The ·000001 part of a gramme of the albuminoid may induce this reaction. This state may persist for years and may even be transmitted to offspring.

Dale states that the blood of animals which have been given an antigen contains at the same moment a special toxigen and a special antitoxin, both furnished by the reaction of the cells of the organism, but Bayliss (1918) says: "The explanation appears to be in a colloidal precipitation process at the surface of the sensitive cells, by which their semipermeability is more or less destroyed."

The idiosyncratic reaction to infinitesimal quantities of certain substances, also usually of an albuminoid nature, is almost certainly of the same nature, and due to similar conditions of the body-cells as exist in anaphylaxis. The violent disturbance produced by minute quantities of honey, ginger, etc., is probably due to these containing some such albuminoid matter, and it is a question whether the similar severe effects of some odours, such as musk and ambergris, may not have a similar origin. The inability of some persons to eat certain articles of food, usually of an albuminoid nature, such as mutton, pork, eggs, etc., is a phenomenon of the same nature. As all these peculiarities usually date from childhood, it is probable that they may have been in many cases acquired *in utero* from toxic conditions of the mother's blood produced by such articles of diet, although they may be acquired later in life.

(9) The intolerance of many drugs, such as quinine, nux vomica, arsenic, and a host of others, is found in very varying degrees, and even in these the reaction is probably due to a change in the body-cells of a character related to the anaphylactic.

The tolerance of drugs is probably a form of phylaxis.

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"Antipathies," often described as idiosyncrasies, are, however, in some cases almost certainly of mental or emotional origin, probably associated with some remote fear. James I's dislike of a drawn sword, the fainting of Tycho Brahe at sight of a fox, of Henry III of France at sight of a cat, and of Marshal D'Albert on seeing a pig, are probably of this kind. Others arise from sensations of smell, as seen in persons affected by the presence of a cat or other animal. Taste antipathies can usually be traced to some special disagreeable experience. The common sensation antipathies are most usually due to the touch of smooth surfaces, and when not acquired by association with the touch of reptiles might be possibly related to the instinctive loathing of reptiles common to man and all anthropoids.

The Divisions of Temperament.

Varieties of temperament were fully recognised by Hippocrates, and these he based almost entirely on physical qualities and external appearances. Galen described nine varieties: four simple—the dry, the moist, the hot, the cold—and four mixed—the hot and moist, the cold and dry, the cold and moist, and the hot and dry—with a ninth, the balanced, in which no quality was in excess.

The humoral pathology, however, furnished the basis of the four divisions that have persisted down to the present day, the predominance of the humour formed by the heart and blood producing the sanguine; that of the liver and bile, the bilious or choleric; humours of the brain, pituitary body and phlegm producing the phlegmatic; and lastly, that of the spleen (which was supposed to secrete black bile), yielding the melancholic.

The recognition of the fact that the spleen did not secrete black bile led to the omission, by many writers, of the melancholic, the term "nervous" or "neurotic" being substituted, as already mentioned.

The description of the melancholic temperament by different authorities varies so widely, and the tendencies to mental and nervous diseases are so emphasised, that it would seem to be more appropriate to describe it as a diathesis, and that they should be excluded from the considerations of temperament on the ground that they have definite tendencies to disease.

The naming of the choleric temperament is unfortunate, since "choleric" in ordinary speech has come to mean passionate, and this is not a predominant character of this division. It would be much better to term it the "sthenic." This would prevent the erroneous description of persons abnormally passionate from being included in this division.

Physical Characters.

Following the views of Hippocrates, it appears right to consider in the first place the physical characteristics of the three temperaments, in

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regard to which there can be no doubt. These are, for the most part, observable at birth, and are related to the nutrition and growth of the individual.

	Sanguine.	Sthenic.	Phlegmatic.
Bones . .	Slight, tending to length.	Strong, of medium length.	Large, coarse.
Body . .	Well proportioned.	Strongly built.	Ungainly, bulky.
Forehead . .	Narrow and high.	Wide and full.	Irregular.
Features . .	Well formed.	Strongly marked.	Not well formed, coarse.
Skin . .	Fine, soft, and thin.	Rough and thick.	Coarse.
Hair . .	Fine, long, wavy, not excessive.	Thick, strong, curly, plentiful.	Coarse, straight, sparsely set.
Pigment . .	Bright colouring.	Dark and strong.	Dull, not marked.
Eyes . .	Blue.	Dark.	Light coloured.
Complexion .	Bright, quickly varying.	Dark, fixed, slowly changing.	Muddy, dull, and little variation.
Circulation .	Quick, excitable.	Steady, not easily excited.	Slow, lethargic.
Nerve reaction	Brisk.	Medium.	Slow.

The majority of these characteristics are present at birth. It is noticeable that fair hair often becomes dark later in life: this is somewhat contrary to Jonathan Hutchinson's view that "pigmentation was the only reliable characteristic in temperaments." After birth developmental processes are precocious in the sanguine, average in the sthenic (choleric), and backward in the phlegmatic.

Temperament, as already stated, is often inherited, but it is not uncommon to observe two or three in the same family, and even other members in whom there is no distinct temperament. They certainly do not follow the Mendelian law of heredity. As already stated temperaments alter as a result of age and disease. Hutchinson remarked on the comparative rarity of marked temperaments, but he must have been speaking of adults only, for a visit to any place in which very young children are congregated would refute this observation. Yet his observation tends to prove that temperaments become less marked with advancing age in many cases.

Mental and Emotional Characteristics.

The mental and emotional characteristics came into play in correspondence with the post-natal development of the brain. Willoughby (Tuke's *Dict. Psych. Med.*) has described them as being, in the sanguine, great susceptibility to external impressions and to the feelings of pleasure and pain attached to these impressions: their mental movements are rapid and shallow; they are impulsive, emotional and

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excitable, easily provoked but as easily forgetting. They lack persistence and have bad memories. They have often powerful imaginations and clever thoughts and are open-minded to new ideas.

Of the sthenic (choleric) he writes: "Mentally they are capable of great exertion; they are not impulsive, but steady in thought and judgment; memory good, speech deliberate but decided, they make up their minds about anything and stick to it. They are passionate and jealous, and do not forget an injury; their feelings are not easily excited but are strong when roused; affections strong."

Of the phlegmatic he writes: "Individuals of this temperament have good judgement but are slow; common sense fairly good, and memory good; not emotional; heavy and plodding; feelings persistent, though powerful, much lack of energy."

This description of the temperaments is not the best that could be made, but is sufficiently clear, and not being made by a man holding any strong views of the basis of temperament, may be held to be free from any theoretic prejudice.

The Physical Basis of Temperament.

The physical basis of temperament has been ascribed not only to the humours but to almost every organ and tissue of the body. To consider these varying views in the order in which they have been propounded would be a voluminous task, and the more direct way of arriving at a conclusion is by considering each organ in the order of its importance, and by the process of exclusion arriving at a definite opinion.

The latest views already alluded to, those of Dr. James Ward and Sir R. Armstrong-Jones, make the grey matter of the *cortex cerebri* the site of the organic origin of temperament. This part of the brain at birth is not developed as a fully functioning organism, whereas temperament is fully evolved in its physical aspects, and to attribute temperament to this part of the brain would appear to be equivalent to endowing this structure with a creative power, antecedent to its development as a functioning organ. The most devoted worshipper of the brain-cell will not claim for it such a marvellous power.

The sensory areas of the brain must be excluded for the same reason, since sight, hearing, taste, and smell are certainly not in active functioning before birth. The motor areas must also be excluded, fœtal movements not being due to sense-perception, Baillarger having shown that they exist in anencephalic fœtuses and persist after craniectomy, being therefore of spinal origin.

Descending still lower in the nervous system it is obvious that the basis cannot be in the respiratory area, which also does not function

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until birth, or in the heat centre, which is not fully active until a little later.

The vaso-motor apparatus is, however, in full activity before birth, and its function plays a prominent part in the characteristics of temperament. The history of the embryonic development of the vascular system, together with observations on the normal and pathological conditions during fœtal life, prove that the activity of this nervous mechanism has been independent of cerebral control. The vaso-motor apparatus is almost certainly dependent in later life on the stimulation received from the internal secreting glands (thyroid, pituitary, etc.) for its functional habits, and it is therefore presumable that in fœtal life its activity is similarly due to stimulation derived through the maternal or fœtal blood. This throws doubt on the vaso-motor apparatus taking an active part in the origination of temperament, however important may be the *rôle* it plays in the manifestations thereof.

The internal secreting glands, by whose activity the function of the vaso-motor is controlled, are probably in their turn dependent for their stimulation on the products of the body-cells. Each cell of the organism, according to conclusions long since arrived at by Brown-Sequard and d'Arsonval, secretes special products and ferments that are poured into the blood, and through that medium influences all the other cells of the organism, thus consolidating them together, quite apart from any action of the nervous system. These views have received strong support from recent observations. The interstitial tissues of the ovary and testis, for example, have been shown to be the source of the sexual hormone, which, quite independently of the nervous system, is the cause of such extensive and varied processes of special nutrition. The investigations of Bayliss and others in regard to secretin in particular, and to hormosomes in general, fully demonstrate the important part played by the body-cells in regard to the endocrine secretions.

This is still further exemplified by the conclusions of Jacques Loeb (the organism as a whole) that the heredity of a genus is determined by "cell" proteins of a definite constitution which differ from those of other genera, and that the different species of the genus have all the same genus proteins. Each species of the same genus has, moreover, proteins differing in chemical constitution which give rise to biologic or immunity reactions of a specific character. This genus and species heredity he traces to the "cytoplasm" of the egg.

Mendelian characters are ascribed to the "chromosomes" of the nucleus of the egg and the head of the sperm, and are determined by hormones that need be neither proteins nor specific, or by enzymes which also need not be specific to the genus or species, all these variations being traced to the original endowment of the body-cells.

Temperamental characters differ widely from the Mendelian in many

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important respects, although they approach it in affecting growth and pigmentation. The main difference is in regard to heredity, which has such undeviating laws in Mendelism, and is of a most uncertain nature in temperaments. In the latter in many cases, as already stated, the temperament is not transmitted, and in others all three temperaments may be seen in the same family as well as the absence of marked temperament. If there is any tendency for temperament to follow the Mendelian heredity laws, it is certainly very faint. The fact that temperaments vary from age, disease and other conditions also tends to show that they are dependent on a much less definite organic basis than that assigned to the Mendelian.

As temperament is fully developed at birth, often varying from the parental characters, this variation must almost certainly be due to maternal conditions during gestation.

The intimate nutritional relations between the mother and the fœtus need no emphasising. The blood-vessels of the ovum are functionally active in the splanchnic mesoblastic area on the wall of the yolk-sac outside the embryo before the latter is folded off from the ovum, and the whole of the nutrition and growth of the fœtus is dependent on them. The activity of the fœtal circulation is so closely correlated with the maternal that any change in the latter must be accompanied by a corresponding change in the former. The mother's habits of nutrition must necessarily be impressed on the fœtus, and it is not unreasonable to suppose that these habits should be carried on by the somatic elements of the child after birth. Hence it must appear probable that if the nutritional conditions of the mother throughout gestation were unusually asthenic, exceptionally active or unduly sluggish, these conditions might be impressed on the body-cells of the infant through the varying maternal endocrine secretions, resulting in a corresponding habit of nutrition or temperament. If the maternal conditions were sufficiently marked, it is possible that they might override other temperamental predispositions. I believe that I have observed such results in a few gestations, but it is necessary that extensive observations should be made, in order to confirm or refute this theory.

It is not a very large demand on the facts advanced to suppose that the long and intimate relation between the mother and fœtus should impress such characters on the somatic elements of the latter.

The fact that important changes, often of a very enduring nature, are produced in the somatic cells in anaphylaxis and similar allied conditions makes this origin of temperament probable and understandable.

The importance of temperament, when markedly present, in the treatment and prognosis of disease is obvious, and is worthy of more consideration than is given it at present. In education, too, it should receive considerable attention, and it should not be without weight in

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deciding the life-work of the individual. To the employer of men in various capacities it should have a certain value, as suggested by Maudsley.

Conclusions.

The conclusions to be drawn from the facts advanced are that temperaments are not dependent on the organisation of the brain or nervous system, or even of its autonomic portion, nor on the endocrine glands, but are due to the somatic elements. That these somatic characters are not so organic as to be inevitably inherited, but are modifiable by protracted variations of nutrition within the limits of normality either during gestation or in after-life, and probably also even under certain conditions of disease.

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The Influence of Song on Mind and Body. An Address (1) given to the Vocal Therapy Society at Lady St. Helier's. By Sir Frederick Mott, K.B.E., M.D., LL.D., F.R.S.

It is now two years since Armistice Day, and I then delivered a short address on vocal therapy and the manner in which it originated at the Maudsley Hospital in small beginnings. It was then energetically supported by Lady Carnarvon, and a society was founded for the purpose of providing teachers for instruction of soldiers and ex-service

(1) Inasmuch as orchestral and vocal music form an important adjunct to treatment in mental hospitals, I ventured to ask the Editors if they would care to publish it in the *Journal of Mental Science*, for although of a popular scientific character it might prove of interest to many of its readers.

[We gladly publish this address, not only for its literary charm and scientific merit, but because it will assist the public and public authorities more thoroughly to appreciate that music in mental hospitals is not merely "to pass the time" or a form of "kindness to patients," but a valuable adjunct to psychic treatment meriting every encouragement and adequate expenditure.—Eds.]

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