

THE PRECISE DIAGNOSTIC VALUE OF ALLOCHIRIA.

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I.—INTRODUCTION AND DEFINITION.

IN the quarter of a century that has elapsed since Obersteiner gave the first clear description of this condition, remarkably little interest has been displayed in it by either neurologists or psychologists. The literature on the subject is sparse and the number of cases that have been recorded is astonishingly few; in less than half a dozen of these has any exact account of the patient's sensory state been given, the symptom being, as a rule, just briefly mentioned, and in only one case has the condition been at all fully described. In a large number of standard text-books, both on general medicine, such as those of Clifford Allbutt, Gibson, Fagge and Pye-Smith, Allchin, and the "Twentieth Century Practice of Medicine," and on neurology, such as those of Allen Starr, Sachs, Dercum, De Fleury, the symptom is not even referred to. In the majority of those that do mention it, quotations from which will presently be given, the writer is content with a definition, or perhaps adds that the symptom occurs in a number of diverse affections, of which tabes and hysteria are the most frequent. No text-book ascribes any value in diagnosis to its presence, with the sole exception of Musser's "Medical Diagnosis" [106], in which it is merely stated that allochiria when general should be regarded as a stigma of hysteria, but when local usually occurs with organic disease of the spinal cord.

The reasons for this lack of interest are perhaps as follows: On the practical side the symptom has been thought to be devoid of value in clinical diagnosis, on account of the multiplicity of the diseases in which it has been observed. On the theoretical side it has similarly been denied interest largely because a simple mechanical explanation, which will presently be criticised, has been widely accepted, so that it would appear as if there remained no further problem to be elucidated. It is my opinion that on both these sides there is scope for a revision of the views at present held on the subject and also for a further elaboration of our knowledge as to the significance of the phenomenon. In the present paper I propose to deal with

only the former of these two sides of the subject, for a discussion of the pathogenesis of the conditions concerned, raising as it does some of the most complex questions in psychology, would lead one beyond the scope of a single article. The second side of the subject will be dealt with in a succeeding article.

In the first place it will be necessary fully to consider the various definitions that have been offered; for lack of precision in this respect has led in the past to considerable obscurity. There has been no clearer or more satisfactory definition suggested up to the present than that originally given by Obersteiner [107] when he said that he applied the term *allochiria* to a condition in which, "though the sensibility is retained more or less completely, the patient is not clear, or is frequently, if not constantly, in error as to which side of the body has been touched." He adds: "The power of localisation is retained as to details, whilst doubt or error exists as to the side touched, the irritation being commonly referred to the corresponding part of the other limb." The essential feature of the condition, according to this definition, is that *in the patient's mind there exists doubt or error as to which side of the body is touched.*

Unfortunately, in later descriptions of the condition attention has almost always been attracted to what is the more striking though probably the less important part of the definition, namely, the feature that the stimulus is commonly referred to the corresponding part of the other limb. On account of its unconsciously biasing the writer to one particular hypothesis as to the explanation of *allochiria*, this point of view is largely responsible for the sterility of our conceptions of the condition; the following instances show how almost universally it is entertained. Gowers and James Taylor in their text-book [54] call *allochiria* "a condition in which an impression on one part has been referred to the corresponding place on the opposite side of the body," and in Gibson's "Text-book of Medicine" [55] they say it is present when "a prick or touch on one leg is referred to the other." Ferrier [43] terms *allochiria* "a form of perversion of sensibility, characterised by an erroneous reference of

sensory impressions to the corresponding part of the other side of the body." Church [28] says that "sometimes the impression is felt on the opposite side of the body at a symmetrical spot—allocheiria." Gay [48] says that it "consists of a perversion of common sensory impressions to such an extent that they are localised to an exactly corresponding area on the opposite side of the body." Musser [106] says that it is "a term employed to describe the reference of a sensory stimulus to the corresponding location on the opposite side of the body." Judson Bury [26] says that "a patient may refer an impression on one side to a corresponding place on the opposite side of the body—then the condition is named allocheiria." Osler [114], speaking of tabes, says that "if the patient is pricked on one limb he may say that he feels it on the other (allocheiria)." Frederick Taylor [127] states that "a touch may be felt at the corresponding part of the opposite side of the body (allochiria)." Pierre Marie, writing in the Charcot-Bouchard-Brissaud "Traité de Médecine" [96], says: "Parfois ils localisent la piqure au point correspondant du membre opposé, c'est ce qu'on a appelé l'allochirie." Dejerine and Thomas, writing in the Brouardel-Gilbert "Traité de Médecine" [30] say: "Exceptionnellement la sensation est perçue sur l'autre membre; c'est de l'allochirie." Brown-Séguard [22] speaks of it as "consistant en ce que le malade croit que l'impression sensitive a été faite sur un côté du corps alors qu'elle l'a été sur l'autre côté." Longuet [92], in his review of the subject, describes allochiria as follows: "Si l'on frôle la peau de la cuisse, du mollet ou de la plante du pied de certains malades, le contact, parfaitement ressenti par le patient, est rapporté par lui, non au membre touché, mais aux points exactement correspondants du membre symétrique." Gellé [51] writes: "L'allochirie consiste dans la perception d'une sensation dans le côté du corps opposé au point où l'excitation a lieu." Mlle. Lapidous, in her thesis on allochiria [85], writes: "Il s'agit d'un trouble dans la localisation des mouvements et des sensations qui fait que le malade rapporte à un côté une sensation partie du côté opposé du corps." Victor Henri [61] writes: "Le malade

commet une erreur de côté; le contact d'un point d'un membre droit est rapporté au point correspondant du membre gauche et réciproquement." Strümpell, in his text-book [126], says: "Die Allocheirie besteht darin, dass ein Hautreiz nicht an der gereizten, sondern an der entsprechenden Stelle auf der anderen Körperhälfte empfunden wird." von Leyden and Goldscheider, in Nothnagel's "Specielle Pathologie und Therapie" [89], call allochiria "ein seltenes und wenig verwerthbares Symptom, darin bestehend, dass ein Reiz, welchen man an einer Extremität des Kranken applicirt, von diesem an der entsprechenden Stelle der anderen Extremität localisirt wird." Huber defines it [66]: "Dass die Kranken die Empfindung eines Reizes nicht in die gereizte Extremitäten, sondern in die entsprechende der anderen Seite verlegen." Weiss calls it [130] "eine Störung der Localisation welche darin besteht, dass die Wahrnehmung einer Empfindung von der gereizten Stelle auf die entsprechende der anderen Körperseite verlegt wird." Hoffmann writes [64]: "Wenn Kranke einen Reiz nicht an der tatsächlich gereizten Hautstelle sondern denselben nach der correspondirenden Stelle der anderseitigen Gliedmassen localisiren, so bezeichnet man diese eigentümliche Anomalie als Allochirie." Morselli [100] defines allochiria as "un fenomeno singolare del riferire la sensazione tattile al punto opposto, ma simmetrico, nel quale veniva toccato."

Even those authors who quote Obersteiner's definition in full usually proceed to consider allochiria purely from the limited point of view indicated above. Thus Blocq, who writes the article on the subject in Richet's "Dictionnaire de Physiologie" [8], first quotes Obersteiner's definition in full and then adds: "Ce signe consiste, en somme, dans le fait de rapporter à une région plus ou moins symétrique du membre de l'autre côté." Bosc, in his monograph on the subject [11], goes so far as sharply to separate the cases in which doubt in the patient's mind as to the side touched is the prominent abnormal feature from those in which deflection of sensation to the wrong side occurs. He calls the former false or pseudo-allochiria, and defines true allochiria [12] as

the condition in which "un malade rapporte à un côté une sensation partie du côté du corps opposé."

It will be seen that, although the above definitions differ considerably on such points as the nature of the stimulus concerned and the degree of exactness in the symmetry between the site of the stimulus and the seat of its localisation, yet they all agree in one thing, namely, that the essential feature in allochiria is the deflection of a sensation to the wrong side of the body. In none of these definitions is any stress laid on the state of the patient's knowledge of right, or left-sidedness, an aspect of the problem which is, in fact, of fundamental importance. In other words, we have no hint so far of the symptom being anything more than a bizarre error in localisation. The position that this point of view logically ends in is reached by Buzzard [27] when he defines allochiria as a condition in which "a point of contact is referred, not to its true locality, but either to some part of the opposite limb or to a distant part of the same member." Here we leave altogether the point on which Obersteiner laid such stress, namely, that there is in allochiria no defect in vertical localisation but merely a confusion in the patient's mind between the opposite sides of the body, and come to look upon the symptom as simply any form of bad mistake in localisation. I shall have later to insist on the significance of this distinction made by Obersteiner, which at first sight seems so unimportant, for I am convinced that the relative sterility of most discussions on the subject is largely due to its having been overlooked. In the literature I have found only three passages outside of Janet's writings in which the above distinction is noted. The first is in Da Costa's "Medical Diagnosis" [29], and runs thus: "Allochiria is a form of perverted sensibility, which may or may not be associated with anæsthesia, and consists in the sensibility being more or less perfect, while there is doubt as to the side touched; indeed, the touch is commonly felt at a corresponding part of the other limb." The second is one in which Mott quotes Obersteiner's definition in full without subsequently modifying it [102]. The third is the definition given by Brécy in the recently appeared "Pratique

Médico-Chirurgicale" [19], in which he says: "Les malades ne reconnaissent plus sur quelle moitié du corps a porté l'excitation, ou bien la localisent en un point plus ou moins symétrique du côté opposé."

On the few occasions in which writers have thought of allochiria as a confusion between the opposite sides of the body rather than as a defect in localisation, they have, curiously enough, overlooked the remaining part of Obersteiner's definition, namely, that the confusion, when present, is in the patient's mind. It has thus come about that almost every symptom or physical sign in neurology that can in any sense of the word be "referred" to the opposite side of the body has been called allochiria, without any further analysis being made of the exact condition present. This to a great extent accounts for the multiplicity of both the varieties and causes of allochiria that have been described, and naturally has tended to confuse and obscure the true picture of the condition. It will be seen on investigation that many of these various affections described as allochiria have hardly anything in common with the condition described by Obersteiner and defined above. To sum up the cardinal features of the condition so defined, there is in the patient's mind doubt or error as to the side touched, whilst sensibility, including the power of localisation, is otherwise retained. Even though only those cases that come strictly under this definition of Obersteiner's be given the name allochiria, there remain, as will presently be pointed out, a sufficiently great number of varieties of the condition.

II.—REVIEW OF PUBLISHED CASES.

Four previous reviews of the literature on the subject have been made: by Longuet in 1884 [92], Weiss in 1891 [132], by Bosc in 1892 [13], and by Determann in 1900 [31]. The last mentioned, who adds but three cases to those collected by Weiss, states that altogether only a little over a dozen cases of all varieties are on record. A more fortunate search, however, has enabled me to read the accounts of some seventy-six cases to which the term allochiria has been applied, and I will briefly consider them

under the various groups into which they enter. Allochiria has been described as occurring in peripheral nerve lesions, hemiplegia, disseminate sclerosis, tabes dorsalis, unilateral injury to the spinal cord, Menière's syndrome, hysteria, symmetrical gangrene; and in connection with touch, pain, the "muscle sense," the temperature sense, sight, smell, taste, hearing, and the electrical reactions. As stated above, many of the cases would be denied the designation allochiria were the original definition adhered to.

(1) *Electromotor Allochiria'*

In 1892 Weiss [133] applied this term to a condition in which "auf elektrische Reize nicht die von Strome durchflossenen Muskeln oder Muskelgruppen, sondern die correspondirenden, nicht erregten der anderen Körperseite mit Zusammenziehung antworten." The expression, however, is usually applied less strictly than is here indicated, and is made to include conditions in which the stimulated muscle responds as well as the contralateral muscle; these Petrina and Senator had previously spoken of as "crossed electrical reflexes." The condition had been previously described on many occasions, three of which are mentioned by Weiss, the first being when Remak mentioned it in 1858 [117] in a case of tabes, under the designation "reflex electrical movements." Similar findings have been recorded in nuclear facial paralysis by Benedikt [1] and Petrina [115], in infranuclear facial paralysis by Brenner [20] and Senator [121], in supranuclear facial paralysis by Hoffmann [65], in traumatic neuritis of the external popliteal nerve by Meyer [97], in myelitis by Gräupner [56], in probable disseminate sclerosis by Fischer [44], in hysteria by Féré [41], and Binet and Féré [4]; they have also been noted by Erb [40]; Weiss calls his case one of symmetrical gangrene [135], but from the atrophy of the small hand muscles, Charcot's joints and other trophic disorders, characteristic sensory changes, and course of the disease, it reads very much like a case of syringomyelia.

The phenomenon may be shown to faradism only (Weiss, Petrina), galvanism only (Remak, Gräupner, Fischer), or to

both faradism and galvanism (Senator, Hoffmann). In cases in which the reaction of degeneration is present the contralateral contraction may similarly show polar changes, indicating a specific action *via* the central nervous system (Gräupner). It has been observed in the face (Brenner, Petrina, Benedikt, Hoffmann, Senator), in the lower limbs (Remak, Meyer, Gräupner, Fischer), and in the upper limbs (Weiss). The contralateral muscles may contract equally and simultaneously with the homolateral muscles, to a less degree, to a greater degree, or they alone may contract. In the last instance the homolateral muscles may contract only with a stronger current than is necessary to evoke contralateral contraction, and in this case their contraction will be less marked than that on the opposite side (Weiss). In nearly all the above cases the stimulus was applied on the affected side, but in Hoffmann's case stimulus of the healthy facial muscle caused contraction of the opposite and paresed facial muscles with a current so weak that the healthy facial did not react. The distant contraction is usually of localised muscle groups, but in Meyer's case it was more general. The clinical significance of the phenomenon is still doubtful. There was for some years a controversy as to whether it always indicated a nuclear lesion, as maintained by Benedikt [2], or whether it could occur also in infranuclear lesions, as was finally demonstrated by Brenner [21]. The majority of the cases, and possibly all, occur with lesions of the lower efferent neurone, other electrical changes being frequently present as well. It is possible that it occurs with organic affections only, for although five out of the above seventeen cases (one described by Féré and four by Binet and Féré) were cases of hysteria, the observations are open to the following criticism. They were published twenty years ago before the importance of the effects of suggestion was recognised, and were studied under the influence of Charcot's teachings on the subject before these were discredited. All the cases had previously been experimented upon and contralateral contraction of muscles induced by mere pressure or touch. Phenomena which are now known to be

the effect of suggestion, such as Charcot's neuro-muscular hyperexcitability, somnambulism from pressure on the vertex, &c., were described in the same cases and their significance erroneously interpreted. The fact that pressure on one forearm caused movement of the opposite forearm forces one to regard with grave suspicion such an occurrence as contraction of the opposite forearm muscles from faradism of the forearm. It is therefore almost certain that these cases should be placed in a completely different category from the twelve organic cases mentioned above.

The origin of the phenomenon in the organic cases is extremely obscure. The fact that contraction of the arm may occur in hemiplegia when the leg is stimulated, and the specific dissociation seen sometimes with galvanism, point strongly to an action *via* the central nervous system. This specific dissociation was mentioned above as occurring in Grüppner's case. Again in Braun's case of hemiplegia, probably of thrombotic origin [18], stimulation of the external popliteal nerve by galvanism caused a marked increase in the contracture of the homolateral arm; this had previously been described by Renak [118], but the interesting feature of Braun's case was that making and breaking the current, applied in this instance to the internal popliteal nerve, regularly caused abduction and adduction of the arm so that what he described as a pendulum movement was set up. What seems to be quite unexplained, however, is the nature of the nervous change that permits an electrical stimulus to be conducted so readily and to act at a distance when the local action is in abeyance. That there is some such special change in the nerve conductivity is indicated, as Weiss hints, by the peculiar nature of the distant contraction, such as the delay before its appearance, the lasting tetanic contracture that may ensue, &c.; we have clearly to do with something more than a mere reflex movement.

Whatever may be the final explanation of this interesting phenomenon, enough has been said to make it evident that the whole subject is an entirely different one from that of allochiria as defined above. The central fact is that an

electrical stimulus may manifest its effect at a distant part of the nervous system; this distant part may be on the same side of the body or on the opposite side; naturally it is more often on the opposite side, because the representations of corresponding contralateral limbs in the spinal cord are nearer to each other than are those of homolateral limbs. This fact, however, has nothing whatever to do with the confusion of the two sides that occurs in the patient's mind when allochiria is present.

(2) *Motor Allochiria.*

The contralateral muscular contraction induced on striking or even touching one limb, described by Trapeznikow [128], Dumontpallier [38], and Binet and Féré [5], will be discussed later in connection with allokinesia.

(3) *Reflex Allochiria.*

Weiss [133] gave this name to the condition present in Ferrier's case [43], in which stimulation of the sole of the foot or of the inner part of the thigh evoked the corresponding reflex on the opposite side only. The same occurrence had been described also by Binet and Féré in connection with the knee-jerks [6.]

Since this date, however, bilateral or contralateral evocation of reflexes has become a well-recognised phenomenon in cases when their activity is exaggerated, and in one instance—the crossed adductor jerk—it is especially common. There is, of course, no possible resemblance to allochiria in the bilateral cases; and even when the reflex is elicited only on the contralateral side we have merely to instance the analogy of the cases in which the direct reaction of the pupil to light is abolished while the consensual reaction is preserved—a condition which no one would think of calling allochiria—to perceive the fundamental dissimilarity of the condition from allochiria.

(4) *Allochiria in connection with the Special Senses.*

(a) *Auditory.*

Three cases have been recorded in connection with the sense of hearing. The first, that of Gellé, was published in

1888 under the title of "Auditive Allochiria in Menière's Disease" [53]. The patient had auditory vertigo due to chronic otitis, and the left ear showed marked hyperæsthesia and hyperexcitability. A bruit that Gellé heard with a stethoscope placed over the right carotid was heard by the patient in the left ear. There seems no reason why such a condition should be called allochiria, for not only is our knowledge very slight as to what such an arterial bruit corresponds with in fact—it is conceivable that the physical signs described might co-exist even with a condition causing a bruit to be really produced on the left side—but even were the observation to be accepted as significant it would be merely an extension of the usual Rinné test. It is not very rare for a tuning-fork to be heard constantly by one ear, on whichever side of the skull it may be placed.

The other two observations were recorded recently by Bonnier [10], one of them in considerable detail, under the title "Allochirie Auriculaire." In these cases a plug of cerumen in one meatus caused a series of symptoms, including pain, deafness, vertigo with unilateral forced movements, &c., which were referred to the opposite ear. The symptoms ceased after the removal of the wax. Discussion of these cases will be reserved until later.

(b) *Visual.*

Two cases of allochiria in connection with vision have been recorded, both in 1888. One was recorded by Féré under the title "Optic Allochiria," but I have not been able to read the original account [42]. The case is said¹ to have occurred in a female hysteric in whom the visual impression received by the right open eye was regularly referred to the left eye, the patient maintaining that she perceived the impression with the left eye, which in fact was shut.

In the same year a similar case was fully described by Magnin, under the title "Visual Allochiria" [94]. The patient, also a female hysteric, had total and complete left

¹ I use this phrase advisedly, for there are certain inconsistencies in the cited accounts of the case that justify some scepticism as to the accuracy of the descriptions.

hemianæsthesia. This included on the same side the conjunctiva, cornea, auditory meatus, and the mucous membrane of the mouth and pharynx. Smell, taste and hearing were abolished on the left side, and on this side there was also absolute achromatopsia and almost complete amaurosis. During hypnosis, when both eyes were open, but their fields separated by the use of a screen, a coloured object held in front of the left eye was recognised, and the patient maintained that she saw the colour with the right eye.

(c) *Gustatory.*

In Ferrier's case [43] a substance placed on one side of the tongue was said to have been tasted on the opposite side, but as touches on that side of the tongue were also referred to the opposite side it is difficult to see how one can in this case dissociate the reference of taste from that of touch.

(5) *Sensory Allochiria.*

We now come to the cases described as sensory allochiria, forty-one in number. I propose to divide these into two groups, which are fundamentally different in their symptomatology and pathogeny. These two groups I shall call for the present (1) alloæsthesia or false allochiria, and (2) dyschiria, including true allochiria, respectively, reserving until later the description of their distinguishing features. Obersteiner did not distinguish between them, nor so far as I know has any other writer, although only the second group conforms to the definition he laid down.

First must be mentioned a condition that has been called allochiria by Longuet [92], but which really enters into neither of the above groups. This is the peculiar diffuse burning pain, termed causalgia by Weir Mitchell [98], that occurs after section of a peripheral nerve, and which may radiate from one limb so widely as to include even the opposite side of the body in its range. Cases of this nature are mentioned by Hutchinson [68], Pirogoff [116], Weir Mitchell [98], and others. While it is probable that false allochiria may occur in bilateral affections of peripheral

nerves, such as multiple neuritis, although no such case has yet been recorded, still it is clear that the condition above mentioned is in no sense related to either variety of allochiria. The mere fact that a lesion may produce a manifestation at distant points, and that some of these distant points may be on the other side of the body from the lesion, has little in common with allochiria. Morselli [100] described under the incorrect title of allochiria a curious case of Jacksonian epilepsy in which a stimulus applied to the inside of the cheek was referred to the outside, and *vice versa*; a touch on the index finger was referred to the thumb. From the brief description given it is difficult to know how the case should be classified.

Certain of the recorded cases of allochiria are described so incompletely that it is impossible to determine which group they belong to. Such are three recorded by von Leyden [90] and Obersteiner [108]. Cases have also been observed by Musser [106], Schiff, Charcot, Van Deen [120], accounts of which I have not been able to find.

The number of probable cases of alloæsthesia or false allochiria on record is eleven. Five of these, published by Brown-Séguard [24], Hertzberg [63], Fischer [45], Obersteiner [109], and Huber [66], almost certainly belong to this category, while the other six, published by Brown-Séguard [25], von Leyden [91], Fischer [46], Obersteiner [110], Determann [32], and Spearman [123], probably do also, as far as one can tell from reading the description of them.

We come last to the cases that enter into the group of true allochiria. They are thirty-one in number, of which two can be classed with only a moderate degree of probability. These two were published, one by Ladame [84] in 1865, the other by Bikeles [3] in 1899. The former was a case of pontine tumour, the latter of a bullet-wound in the motor area. The symptom is only briefly mentioned in both cases.

The other twenty-nine cases were published in this order, one by Obersteiner [111] in 1881, one each by Ferrier [43]

and Dobie [37] in 1882, one by Hammond [57] in 1883, two by Magnin [95] and one by Féré [41] in 1888, one by Pierre Janet [69] in 1890, one by Weiss [130] in 1891, two by Bosc [14] and one by Kerr [83] in 1892, one by Gay [50] in 1893, eleven by Sollier [122] in 1897, one by Lapidous [86] in 1899, three by Trapeznikow [128] in 1901, and one by Sabrazès and Bousquet [119] in 1905. Of these twenty-nine, twenty-two were published as being straightforward cases of hysteria and nothing else; these comprise eleven by Sollier, two each by Magnin and Trapeznikow, and one each by Obersteiner, Dobie, Féré, Janet, Bosc, Kerr, and Lapidous. In two of these cases the symptom occurred only during hypnosis, one being published by Magnin, the other by Bosc. Two more were published as being cases of hysteria, combined, one certainly and the other possibly, with organic disease. The former (Weiss's case) was one of tabes certainly combined with hysteria. The other (Sabrazès and Bousquet's case) was one of undoubted hysteria, which, however, the authors suspect may have been superadded to some organic affection such as disseminate sclerosis; there was, however, no evidence of this, and it was clear, as the authors state, that the hysteria that was certainly present could have accounted for all the symptoms. Of the remaining five, two were observed a quarter of a century ago, at a time when our knowledge of the more severe forms of traumatic hysteria was extremely small. Reading the descriptions of them in the light of modern studies such as that of Sidis's well-known Hanna case, &c., one can say almost with certainty that in both instances the diagnosis of traumatic hysteria would have been made to-day. In the one case, that of Hammond, the condition was thought to be lateral sclerosis; in the other, that of Ferrier, no diagnosis was given. Of the three remaining cases, in one, published by Trapeznikow, no details are given in the German translation accessible to me beyond the statement that the patient had vertebral ankylosis; the writer, however, comes to the conclusion that the symptom of allochuria is always of psychical origin, so we may suppose that some psychoneurosis was present in this case. In the other two cases

an organic affection of the nervous system was present, but in both there was reason to suspect the presence of hysteria. In Gay's case of diphtheritic paralysis in a girl, aged 13, the aphonia coming on four or five weeks after the illness, the ataxy, the anosmia, and the hypoesthesia of the whole body, make it practically certain, as pointed out by Determann [33], that hysteria was superadded to the organic condition. In Bosc's case of fatal hemiplegia there were also some symptoms indicative of the presence of hysteria. Thus when the foot was pricked there occurred intense cephalalgia and no sensation localised anywhere else; a prick or heat applied to the left arm caused the same severe head pain, which was otherwise absent, together with pain in the right arm; these symptoms are known to be characteristic of hysteria. Nothing but slight hypoesthesia was present on the hemiplegic side at first, and the allochiric condition came on only later. Further, the patient had for a year been confined for "melancholia."

To sum up, out of these twenty-nine undoubted cases of true allochiria, in twenty-six there is no reason to suppose that any other nervous condition besides hysteria was present; in the other three, cases of tabes, hemiplegia, and diphtheritic paralysis, there was reason to suppose that hysteria was present in addition to the organic affection. The overwhelming importance of hysteria in this connection is thus obvious, a conclusion that can be supported by evidence of quite another nature.

III.—DESCRIPTION OF TRUE AND FALSE ALLOCHIRIA.

I hope later to publish a detailed account of some cases that I have studied, together with a discussion of the pathogenesis of the different conditions. In the present paper I propose to offer only a descriptive account of the clinical features of the conditions, based on the observations made in connexion with these cases.

(1) *Separation of Dyschiria from Alloesthesia.*

It is the main thesis of this paper to maintain that when a patient makes a mistake in naming the side of a

cutaneous stimulus that mistake may arise in two fundamentally different ways and from two fundamentally different conditions. These two different kinds of mistakes have in the past been confused under the one name of *allochiria*, and, further, an essentially identical pathogenesis has incorrectly been thought to underlie both. Now only one of the two conditions corresponds at all closely with the definition originally given by Obersteiner, so that the other condition, called above false *allochiria*, has no claim at all to the designation of *allochiria*; this in spite of the fact that Obersteiner, who, like all subsequent writers, did not recognise the distinction between the two classes, gave instances of both conditions in the cases he described in his original article. The one condition, false *allochiria*, is nothing more or less than *alloæsthesia*. The other condition comprises three sub-varieties. I have proposed [79] to call this group *dyschiria*,¹ reserving the term *allochiria* for one of the varieties, for reasons which will presently be explained. The only substantial advance in our knowledge of the subject since Obersteiner's writings was made by Pierre Janet [70]. Janet observed in a case of hysteria that the *allochiric* manifestations could be clearly divided into three stages which, described shortly, were as follows: In the first stage the patient did not know the side of the stimulus, in the second she referred it to the opposite side, and in the third to both sides. These stages will be more fully described presently. Janet, however, probably because he recognised only some of the manifestations characteristic of the condition, did not appreciate that the condition was essentially different from the error in *alloæsthesia*, and hence concluded, like all other writers, that it might occur in a number of diseases, including *tabes*, *hysteria*, &c. [71].

¹ This word emphasises the fact that the condition is primarily a disturbance of the sense of right- or left-handedness. Certain writers, such as Gay [48] and Longuet [92], have objected to the propriety of the term *allochiria*, first employed by Obersteiner [113], on the ground that the symptom in question is more often met with in the feet than in the hands. The use of the root *χειρ* may, however, be defended for the first-mentioned reason. Its appropriateness will naturally appeal most to those nations, such as the English, and to a less extent the Germans and Italians, who habitually use the word "hand" to denote the right or left side, and must be less obvious to those, such as the French, Dutch and Spanish, who less frequently use it for this purpose.

Amongst other decisive reasons for separating these two conditions I might at the outset mention the following. If we refer to Obersteiner's definition given above we see that the chief point he lays stress on, and which constitutes the essence of his discovery, is the fact that certain patients are in doubt or error about the side of a given cutaneous stimulus *while cutaneous sensibility and the power of localisation are otherwise retained*; in other words, that there exists a specific defect relating to the determination of the side of a stimulus. As will be explained later, it is more accurate to substitute the word "ignorance" for "doubt" in this definition, but otherwise it remains to-day as the most accurate, though of course incomplete, description of a certain peculiar condition. Now this condition is dyschiria and not alloæsthesia; the essential point of the definition applies exactly to the former and in no sense to the latter. In dyschiria the failure to determine the correct side is a specific failure and is quite independent of any other failure as regards perception of the stimulus. In other words, the patient may recognise every single feature concerning a given stimulus—its precise nature, position &c.—except the one point of its side. The evidence goes to show that there is present a mental defect of the specific feeling of "sidedness," of what may be called the chirognostic sense. On the contrary the mistake in alloæsthesia is essentially due to incomplete perception of the stimulus and is accompanied by many other failures in perception, such as defective localisation. Janet, on the other hand, considered that in both the hysterical and organic cases (here called dyschiria and alloæsthesia respectively) the defect was dependent on hypoæsthesia, and that the only difference in the two cases lay in the fact that in the former the hypoæsthesia is of psychological, in the latter of physical origin [72]. My observations have convinced me that no hypoæsthesia, even in the faintest degree, is necessary for the production of dyschiria, and that the hypoæsthesia which is often present is quite fortuitous and occurs merely because it happens to be a frequent symptom in the affection producing dyschiria.

We may now pass to a consideration of the clinical

features that characterise the conditions in question. Alloæsthesia is such a well-known condition that no special description of it need be given except in so far as the points differentiating it from allochiria are concerned. Separate accounts of the three varieties of dyschiria will first be given and then some features common to all mentioned. There are three manifestations of each variety—sensory, motor and introspective.

(2) *Description of Dyschiria.*

(a) *Achiria.*

For the first variety, which is identical with what Janet [76] called "simple allochiria," and which possibly corresponds with the state of confusion that Bosc [11] spoke of as "False Allochiria," I have proposed the term Achiria [80], for its most striking feature is the failure as regards the feeling of "sidedness" or "handedness."

(1) *Sensory.*—A stimulus applied to the affected part arouses no feeling of "sidedness" whatever. It is not accurate to say that the patient is in *doubt* as to which side the stimulus has been applied; he is quite sure that he has no idea on the subject and refuses to make any guess. All he can say is that such and such a stimulus has been applied to such and such a part of the body, but as to which side of the body he has no notion.

Apart from this single fact there is no defect of sensorial acuity, even with the most rigorous testing. The stimulus is perfectly appreciated, its exact nature recognised, and its position correctly localised.

(2) *Motor.*—If the patient is asked to carry out any movement with the limb in question he is unable to do so unless the limb is indicated in some other way than by the use of the words right and left. The reason for this is that he has lost the knowledge of the meaning of these words, either altogether or at all events when they are applied to the limb concerned.

(3) *Introspective.*—The patient has lost the memory for the feeling of the part of the body concerned, and declares that though he knows he has such a part he cannot feel it.

(b) Allochiria.

The second variety corresponds with what Janet [73] called "complete allochiria" and Bosc [12] "true allochiria." I would suggest that the term "allochiria" be retained solely for this variety, the condition in which stimuli are constantly referred to the corresponding point on the opposite side. This restriction of the term, besides giving us an increase in precision, has the further advantage of agreeing with the sense in which it has been used by every writer other than Obersteiner.¹ As stated above, Obersteiner's definition applies to the group here called dyschiria, while all subsequent writers have selected one feature in his definition and called it allochiria. That feature is the characteristic of the condition here also called allochiria, so that my suggestion is in conformity with the accepted use of the term, though it departs from the way in which Obersteiner defined it. The three manifestations are as follows:—

(1) *Sensory*.—Stimuli applied to the affected part are invariably referred to the corresponding point on the opposite side of the body. This is done with an air of absolute conviction, so that, for instance, a patient showing allochiria on the right side only feels no more certain that a stimulus is on the left side when it is applied on this side than when it really is applied on the right. The point to which they are referred on the opposite side corresponds exactly with the symmetrical point touched, a fact which in itself disposes of the view that allochiria is in any way merely a disturbance of localisation. As will be mentioned later the symptom may be present in connection with some kinds of stimuli and not others; thus painful stimuli may be referred, but not tactile, but when one given stimulus is referred then all similar ones are also; it is not a question of some or most, but every one without exception.

(2) *Motor*.—If the patient is asked to carry out a movement on the affected side he does so with the corresponding part of the opposite side, fully under the impression (if his

¹ With the exception of Janet, who uses it in Obersteiner's sense.

eyes are closed) that he has correctly performed the required movement. The term *allokinesia* has been used—see, for example, Blocq's definition [9]—to indicate this symptom, which has been described in cases of hysteria by Binet [5], Janet [77], Féré [41], and others; Blocq says that it occurs only in this affection. It seems unnecessary to use a separate term to indicate the symptom, unless it be found convenient to add the prefix "motor." as Lapidous [85] did. The use of a separate term has in the past served to create an artificial separation between two aspects of what is essentially the same condition. *Allochiria* is neither a motor nor a sensory phenomenon, but a psychological phenomenon having both motor and sensory manifestations. An instance of what may result from the non-recognition of this fact and of the importance of suggestive influence is found in the cases recorded, for instance, by Trapieznikow [128], Dumontpallier [38], and Binet and Féré [5], in which stroking one side led to movement of the opposite arm. Here the allochiric patient felt that he was expected to make a movement in response to the stimulus, *i.e.*, on the opposite side. I need hardly say that such cases in the past have led to other interpretations than the simple one here offered.

(3) *Introspective*.—The chirognostic sense is altered as follows: In a bilateral case the patient can appreciate a given feeling of "sidedness" only when the opposite limb is moved or stimulated. In a unilateral case he can appreciate the feeling of "sidedness" of an affected part only when he is moving the corresponding part of the opposite side under the impression that he is moving the part in question; if he really moves the affected part, or if this is stimulated, he invariably gets the feeling of "sidedness" of the opposite part.

(c) *Synchiria*.

To the third variety Janet [74] has given the appropriate name of *synchiria*. The manifestations of it are as follows:—

(1) *Sensory*.—A stimulus applied to the affected part evokes two simultaneous sensations, which are referred to

the corresponding points on both sides of the body. Either or neither of these two sensations may seem more distinct than the other, so that three substages of the condition can be distinguished.

(2) *Motor*.—When the patient is asked to carry out a movement on the affected side he does so on both sides, though in so doing he gets only the feeling of “sidedness” of the affected part. This symptom reminds one superficially of the synkinesia seen in organic hemiplegia, though, of course, the pathogenesis of the two symptoms is entirely different. It is undesirable that the term synkinesia should be used for two phenomena, one physiological and the other psychological, especially when we have the more descriptive term “motor synchiria” available for the latter; this confusion shows further how unfortunate was the choice of the term *allokinesia* to designate motor *allochiria*, for the use of it tends to involve the use of the term synkinesia in an ambiguous sense.

(3) *Introspective*.—The patient is unable, either spontaneously or when cutaneous stimulation is applied, to appreciate the affected feeling of “sidedness” alone apart from the simultaneously appreciated feeling of the corresponding opposite side, though he can appreciate it when he moves both limbs together under the impression that he is moving only the affected one.

We have next to consider some features that refer to all varieties of *dyschiria*.

(3) *Distribution of Dyschiria.*

Dyschiria may occur in relation to any or every segment of the body. In the cases recorded by Ferrier, Janet, and Gay it was bilateral and general. In some cases, as in those recorded by Dobie, Bosc, Féré, and Magnin, it may be restricted to certain regions of the body, even to only one conjunctiva. In certain cases, such as in Ferrier's, the distribution may vary at different stages of the complaint.

In the same part of the body *dyschiria* may be manifested in connection with all or with only some of the functions of the part. It may thus concern only motor

functions or only sensory or both. Further, it may be manifested in connection with all varieties of sensibility or only with some; for instance, in Dobie's case of allochiria only painful stimuli were referred to the opposite side. This interesting dissociation may be otherwise expressed by saying that only certain kinds of stimuli can arouse the appropriate feeling of sidedness and not others, an occurrence highly characteristic of the specialised dis-aggregations of hysteria. As stated above, however, if a dyschiric manifestation is shown in relation to a given kind of stimulus—for instance, a painful one—it is constantly and invariably shown with every repetition of the same kind of stimulus.

(4) *Sensibility in Dyschiria.*

Two facts should be prominently stated in this connection. First, that though defects in sensibility often, perhaps even usually, occur in accompaniment with dyschiria, they bear no relation to this symptom; they vary independently of it, and finally they need not be present at all. With the most careful examination I have found sensory acuity to be perfectly normal in each of the three varieties of dyschiria. Secondly, in all stages of dyschiria there are certain peculiar attributes constantly present in sensation evoked by stimulation of the affected part. I have proposed the name Phrictopathic Sensation [80] to indicate sensation having these special attributes—six in number—and need not describe them further here, especially as I hope soon to publish an analysis of the phenomenon.

(5) *Clinical Course.*

In the twenty-nine hitherto published cases of dyschiria, allochiria was present in all, synchiria in two (Ferrier's and Janet's), and achiria in only one (Janet's.) There is much experimental evidence that goes strongly to show that allochiria is the stable state of the three, and that though allochiria may probably occur without the other two ever being manifest, the reverse is most unlikely. This would, of course, explain why allochiria is the variety that has

been most frequently observed and why attention has, apart from Janet's writings, been confined to this variety. Of the three varieties achiria represents the most advanced stage of psychological disaggregation and synchronia the least. Most of the cases were apparently observed for only a very short period, so that we have little data to decide the question of how long the syndrome may last. That this may be for a considerable period is, however, certain from the fact that in Janet's case allochiria was present for at least twelve years, and in one of mine for probably six years.

(6) *Relation to Consciousness.*

Like so many hysterical defects the dyschiric manifestations are more marked the more clearly conscious the mental process concerned. This may be demonstrated in both the sensory and motor aspects, but I will content myself here with the following illustration taken from the latter. One of my patients with unilateral allochiria could walk perfectly well in the ordinary way when not paying attention to the act, but whenever he became specially conscious of the necessary movements the allochiric disturbance manifested itself. Thus when trying to step on to an omnibus with the affected leg "both legs wanted to move at once," as he put it, and he would frequently topple over.

IV.—THEORY OF ALLOCHIRIA.

In this section I propose to give a criticism only of previous hypotheses in the light of my own observations, for a full discussion of the actual psychical pathogenesis of the condition would lead us too far from the clinical purpose of this paper.

The current and most widely accepted explanation of allochiria is usually styled "Hammond's theory," though all the essential points of the hypothesis had previously been described in 1880 by Fischer [47]; it has been well expounded and developed between 1887 and 1900, particularly by Huber [67], Weiss [134], Bosc [15], Mott [103],

Gay [49], and Determann [34]. As given by Hammond [58], this view runs as follows: Starting from the assumption that "it is quite certain that there is an almost complete decussation of the sensory fibres within the grey matter" (page 36), he concludes that "with a lesion of one posterior horn the sensation would be directed through the grey commissural fibres to the other posterior horn and would reach the cortical centre in the corresponding hemisphere" (page 37), the sensation being then referred by this hemisphere to the wrong side of the body. If we do not enquire too closely into the nature of the process by which the "sensation" is deflected through "grey commissural fibres," this hypothesis presents on the surface an attractive simplicity, and most later writers have found it irresistible, failing thus to appreciate the difference between the simple and the true. Hammond goes on to say that if another unilateral lesion supervened at a different level from the first, the sensation that was previously deflected to the wrong hemisphere was now rediverted by meeting with another obstacle, and so arrived at its proper hemisphere. To quote further: "Such lesions explain those cases in which absolute anæsthesia on one side of the body exists, with sensation on the other side for impressions coming from both sides." It is difficult to interpret this confused passage and to see how there can be sensation on one side for impressions coming from the other if there exists absolute anæsthesia on this other. It is to be supposed that what the writer meant was that allochiria occurs equally with unilateral and bilateral lesions—so long as the latter are asymmetrical—though it is on different sides in the two cases. Hammond also applied his hypothesis with equal confidence to the explanation of the Brown-Séquard hemisection phenomena. He says: "This circumstance, which has not been hitherto explained, is, I think, satisfactorily accounted for by the theory I have proposed. For the parts below, corresponding to the cut half of the cord—for example, the right—not only remain in undisturbed relation with their proper cortical centre in the left hemisphere, but this latter receives also the sensory impressions coming from the left side.

There will therefore be increased sensibility in the left side. Numerous facts in morbid anatomy and pathology could readily be brought forward in support of this view." None of these facts are quoted, however, nor does Hammond make it clear in what way a greater inflow of impressions is synonymous with cutaneous hyperæsthesia.

In spite of the obvious defects of the above hypothesis, it has been considered an adequate explanation of allochiria by the majority of writers on the subject. The hypothesis has been accepted not only by the authorities cited above, but also by Obersteiner [112], Brown-Séguard [23], Gellé [52], Morselli [101] and by von Leyden and Goldscheider, writing in the current edition of Nothnagel's "Specielle Pathologie und Therapie" [89]. Some of these authors have found it quite illuminating; Gellé calls Hammond's ideas and diagrams "très démonstratifs"; Brown-Séguard: "Je ne crois pas qu'il y ait dans les faits d'allochirie rien de difficile à expliquer aujourd'hui que l'on sait que les deux moitiés de la moelle épinière, comme les deux moitiés de l'encéphale, ont de très nombreuses communications et que chacune de ces moitiés peut remplir le rôle de l'autre. On comprend donc aisément comment les impressions sensibles venues d'un côté du corps peuvent être perçues comme si elles provenaient du côté opposé." Weiss enthusiastically says that "diese von Hammond für einen speciellen Fall aufgestellte mit den physiologischen Thatsachen sich vollkommen deckende Theorie kann meiner Meinung nach ungezwungen für alle Fälle Geltung haben."

Now quite apart from any psychological considerations, there are insuperable objections to Hammond's hypothesis, even if this be viewed from his own standpoint. The whole superstructure of his speculations rests less upon a basis of neurological fact than upon the insecure foundations of an argument by analogy. The mechanism of the paths in the spinal cord is assumed to be comparable with that of a railway, as is indicated by the phraseology employed, blocks, signals, tracks, switches, shunts, and junctions being pictured in the most realistic manner. Then by way of finding out what happens in the spinal cord under certain circumstances,

the results of analogous emergencies are studied on the railway, and the information thus gained is applied in the most literal manner to the spinal cord. Hence the conclusion that a message, finding a block on its normal route, changes to another line which unfortunately brings it to the wrong destination. Hence also the irritability or hyperæsthesia that ensues from the congestion of traffic due to the overworking of the second line. If by a happy chance another block leads the message to take again the original line it now arrives at its proper destination, a little delay, however, being noticeable.

A word may be said on the *a priori* improbability of this conception of the functions of the spinal cord. The cord is, phylogenetically speaking, one of the most ancient structures in the body, having been gradually evolved during many millions of years. As might have been expected from this consideration, all the evidence we have as to its physiology and pathology points to its functioning being of the most fixed and stereotyped nature. The very fact of its relative minuteness in man, as contrasted with lower animals, compels us to regard it as a tightly packed bundle of constituents, each having a highly differentiated and predetermined function. The conception of it as a plastic and relatively homogeneous whole, the different parts of which are prepared at a moment's notice to take over all the functions of other parts, thus conflicts violently with all we know of its history and structure.

Even, however, if we grant for a moment the likelihood of the proposition, we still find that it is out of accord with some commonly known facts concerning allochiria. Thus Longuet [93], after rather ironically remarking in connection with Hammond's explanation of the Brown-Séguard phenomenon, "Ce schéma donne également la clé de ce fait de médecine expérimentale qui a tant intrigué les physiologistes depuis Galen," points out that the hyperæsthesia of this phenomenon should always be accompanied by allochiria, which is far from being the rule. More striking than its not being the rule, as Longuet cautiously remarks, is the fact that no case has ever been published in which it has

been observed, for the allochiric symptom mentioned by Brown-Séguard and Spearman in their cases is evidently not true allochiria, since the sensations were localised at various distant points, *some* of which happened to be on the opposite side. No cases of this nature have been more carefully investigated than the eight recently published by Head and Thompson [59], and in none of these was transference of sensation observed. Even the most carefully performed experiments on the lower animals have never resulted in the production of allochiria. It is true that Mott in his well-known hemisection experiments on monkeys [104] observed transference of sensation, which he explained by the crossing of impulses to the opposite side, but it is clear that we have here again to do with alloæsthesia and not allochiria, for Mott says [105] that there was great disturbance of localisation in the paralysed limb, and evidently the whole sensibility of the limb was greatly impaired. So far as I know even this false allochiria has not been observed in other extensive series of hemisection experiments, such as those made by Aldren Turner [129].

We are left, therefore, with the difficulty of understanding why allochiria, if it is due to the presence of a unilateral lesion, is rarely if ever seen when such a lesion occurs; Hammond insisted, on the contrary, that such a lesion must uniformly bring about allochiria. A further difficulty is how to explain by this hypothesis the short duration of the symptom which is a manifest feature in most of the recorded cases. Huber, who fully accepts Hammond's hypothesis and calls it "durchaus wahrscheinlich," explains the recovery in his case, one of disseminate sclerosis, by assuming the appearance of a new lesion on the opposite side from that of the first, the fresh block rediverting the impulse towards its original destination [67]. He expresses no surprise, however, at the non-appearance of allochiria on the opposite side, which surely might have been expected, unless one supposes that the second block beneficently limited its diverting influence to those impulses that were travelling on the wrong line. Weiss, who is in general a warm adherent of Hammond's diverting hypothesis, rejects Huber's application

of it to the recovering cases on the ground that it is too complicated [131]. He attributes the disappearance of the symptom to retrogression of the lesion, so that the track is again cleared. This is, of course, a large assumption to make in the case of tabes and certain other cord diseases.

The incapacity of the hypothesis to assimilate further aspects of the problem was most strikingly shown when observations began to multiply in which the spinal cord was normal throughout. Huber, in 1888, instituted the division of cases into spinal and non-spinal [67], but attempted no explanation of the latter group. Weiss, in 1891, rejected this division, as also that of Obersteiner, into spinal and hysterical, and considered that all the cases were equally explicable on Hammond's hypothesis. The only difference he saw between the hysterical and the organic cases was that in the former case the block in the posterior columns was of a functional nature [134]. He does not attempt to clarify this vague notion of a local obstruction of a functional nature, which is difficult seriously to discuss. Determann has severely criticised its glaring inconsistency with all modern knowledge of hysteria [35]. In 1892 Bosc [16], by the publication of his fatal case of hemiplegia, showed conclusively that allochiria could occur apart from cord affections, and divided the cases into spinal and cerebral, including hysteria under the latter term. He considered that all the organic cases were explicable on Hammond's hypothesis, and accounted for the hysterical cases by postulating "an altered dynamic state of the cerebral hemisphere concerned, of such a nature that the impulses reaching it crossed through the corpus callosum to the opposite hemisphere, which therefore became endowed with the dynamic state of both hemispheres" [17]. It cannot be maintained that this conception greatly furthers our comprehension of the condition. He expounded the railroad hypothesis at great length and introduced a new terminology, based on the modern tendency to electrification, in his remark that "the grey matter plays the *rôle* of a commutator" [15]. Determann, in his monograph in 1900 [35], took up much the same standpoint as Bosc.

Ever since Bosc's writings all writers have agreed that Hammond's explanation was of limited applicability only, and that there was definitely a group of cases for which some other explanation would have to be sought. Morselli [101] still further limited the range over which it could be applied by rejecting it in connection with all the cerebral cases, though he still accepted it as explaining the spinal cases; he offered no suggestion for the former group. It would be very curious if a peculiar phenomenon like allochiria could be produced in two quite different ways, and Grainger Stewart in 1894 [125] voiced a very obvious reflection when he said that he "doubts whether the blocking hypothesis proves very satisfying to anyone." He further remarked that the results of his study of a case of alloesthesia "lend some support to the opinion that in allochiria the fault is not so much in the conducting fibres as in a morbid action of the centres."

So much for the physiological aspects of the subject. On this side speculation has come to a full stop, and writers who take the physiological standpoint can be divided into those who accept without analysis a doctrine that is incompatible with the facts, and those who despondently admit their failure to understand any of the mechanism of the phenomenon. It was only when the subject was viewed from a psychological standpoint that any light at all was thrown on it. The most important contributions from this standpoint are those of Pierre Janet, his first in 1890 [69] being amplified in 1893 [78] and 1898 [70]. Janet's views have not received the attention they deserve. A short summary of them is given by Binswanger [7] and Lapidous [87], who, however, offer no criticism or further suggestions; both refer to them only in connection with hysteria, and Lapidous expressly commits herself to the belief in three groups of cases—hysterical, cerebral, and spinal, accepting Hammond's explanation of the latter two [88]. Trapieznikow [128] agrees with Janet that an anatomical origin of the phenomenon cannot be accepted, and that it must be considered as a perception defect. He hints that the psychic explanation is applicable to all cases and rejects the division

into spinal and cerebral. He contributes nothing to the elucidation of the mechanism of the phenomenon.

Important contributions to the psychology of the problem have been made by Henry Head [60] and Spearman [124]; Victor Henri has also referred to the subject from this standpoint [62]. Although these last three writers use the term *allochiria* it is clear that the condition they were discussing was that of *alloesthesia*, in which the symptom we have here called false *allochiria* may appear. Their contributions are therefore of value only so far as this condition is concerned. From the enormous mass of work done on the complex subject of localisation by these and other authorities, an adequate explanation of the nature of *alloesthesia* seems definitely to emerge. This is perhaps most precisely voiced in Spearman's statement that the main factor in the production of the condition is a defect in the "articular" excitations; the "segmental" excitations supply very imperfect material for the accurate determination of the position and side of the stimulus, so that when they alone are relied on, and especially when they too are deficient on account of cutaneous *hypoesthesia*, the failure becomes manifest. This defect may occur in hysteria, but is more usually due to a gross lesion in the projection system of afferent fibres, and it is interesting to note that the disease in which the greatest defect in "articular" excitations occurs, namely *tabes*, is the disease in which the symptom of false *allochiria*, due to *alloesthesia*, has been most frequently described.

It would be impossible adequately to discuss Janet's psychological considerations here, and I will add nothing to the remarks offered above (*see* Introduction to Section III.), which sufficiently indicate the difference of my standpoint from his. My observations point to the view that *dyschiria* is due to a psychological affection of the feeling of "sidedness," and that the mechanism whereby the different varieties of the syndrome are produced is also psychological in nature; the actual problems of pathogenesis I hope to discuss in a future paper.

V.—DIAGNOSIS OF DYSCHIRIA.

It will be convenient to consider separately the sensory and motor aspects of this problem. The discussion of them may be prefaced by the general remark that if the facts of dyschiria, as described above, are borne in mind, it is practically impossible to make any mistake in the diagnosis of the condition. In the absence of this knowledge, however, there are a number of ways in which the various symptoms may be overlooked or misinterpreted, and as the condition frequently goes unrecognised it is perhaps worth while to mention the possible fallacies of observation in some detail, elementary as they may seem. Dyschiria is interesting in this respect as being one of the rare examples in medicine in which erroneous diagnosis is due rather to ignorance of a few simple facts than to any failure in judgment.

(a) Sensory.

In the first place it is evident that the sensory manifestations will probably be altogether overlooked if, when testing a patient's localising capacity, the observer neglects to enquire expressly as to the side to which the sensation is referred. This omission is especially likely to be made when, as in dyschiria, the patient shows no defect in sensorial acuity and localises the stimulus with exactitude and certainty. Under such circumstances, even if the patient mentions the wrong side, this may be attributed to a slip of the tongue, and the matter not pursued any further.

I have formulated elsewhere [80] seven precise differentiating features between allochiria and alloæsthesia, so that they need not be recounted here.

All the three subvarieties of synchiria may give rise to special fallacies. In the first and most advanced of these the contralateral sensation is felt to be more distinct than the other, and if the patient mentions only the more distinct one the condition is liable to be mistaken for allochiria.

A patient may say that he cannot tell on which side certain stimuli are applied. If this observation is correct it is pathognomonic of the existence of achiria, provided that

sensibility is intact. As, however, this condition has never been described in any neurological journal or text-book, the observation has a considerable chance of being misinterpreted. There is one fallacy in connection with it, namely, that a patient in the second stage of synchiria is liable to make the same answer, if he thinks that only one stimulus has been applied, for he feels two sensations equally distinctly and cannot decide between them; if this fallacy is not avoided a serious prognostic error may be committed.

In the third subvariety of synchiria the homolateral sensation is the more distinct, and if the patient mentions only this one the state of affairs may be thought to be normal.

The only way of avoiding with certainty the above fallacies in connection with synchiria is to put the leading question to the patient as to whether he feels the stimulus on both sides or on only one.

Lastly, it should be stated that just before synchiria is replaced by the normal state there is a period when the patient feels only a homolateral sensation. If sensibility is being tested at this time, unless the pictopathic features of the sensation are noted the condition is almost certain to be overlooked. As this period may be of only momentary duration it is easy to see how the clue to the various other phenomena present may thus be completely missed.

Finally, it must be remembered that the dyschiric manifestations may be confined to certain regions of the body only, and may relate only to certain kinds of stimuli.

(b) *Motor.*

On the motor side the possible errors in observation are both more important and less obvious. The patient's symptoms may be described in a very misleading way. Unless the motor manifestations are carefully analysed they may, particularly in achiria, readily be interpreted as clumsiness and weakness. Tests for motor incoördination elicit fumbling movements badly adapted to the end in view, and when the patient's strength is tested directly—for instance, in the performance of such a simple act as hand-gripping—

the conscious effort produces such disproportionately slight results that the presence of marked paresis is readily assumed.

The functional basis of the motor manifestations will probably be recognised if their distribution is general and bilateral, but it is less likely to be when the distribution is monoplegic or hemiplegic. In the latter instance the resemblance to incomplete hemiplegia is very striking, as may be better realised by shortly considering the notes of one of my cases made when the patient came under observation.

In the achiric stage this patient complained of weakness and awkwardness of the right side. Examination apparently confirmed the truth of this statement and, as occurs in all varieties of hemiplegia, the defect was most marked for acts consciously performed; in fact it was present only in relation to such acts. The immediate reason of the patient's coming to hospital was his alarm at the fact that in an automatic state he had felled a man to the ground the week before. The same hand could with a dynamometer register only 5 lb. The gait was that of a hysterical hemiplegia, the right leg being dragged in the inert manner so long ago described by Todd. All the signs of supranuclear facial paralysis were present in their entirety, including the shallowing of the naso-labial furrow, non-movement of the side volitionally, with retention of emotional movements, Revilliod's orbicularis sign, &c. The deep reflexes were active, a marked tendency to ankle-clonus was present and sharp extension of all the toes followed plantar stimulation, the resemblance to Babinski's sign being, however, incomplete. Under these circumstances it is comprehensible how more than one neurologist had previously made in this case the diagnosis of hemiplegia of organic origin. Even if the case had been called one of hysterical hemiplegia the error in diagnosis would have been serious, for re-educative measures might thereby have been directed to the motor aspect instead of to what is much more nearly a sensory aspect.

A symptom is frequently met with in all the dyschiric

stages that may readily be mistaken for aboulia, a mistake that would also direct treatment on quite erroneous lines. When the patient is asked to perform a simple act no movement may result in spite of his efforts; this can, however, be at once told from aboulia in that the patient, unless he is watching the limb, is under the full impression that he has carried out the act successfully and distinctly feels the limb move, although in fact it remains at rest. Consequently there is none of the recognition of failure and feeling of powerlessness that characterises an aboulia. Further, there are objective evidences that effort is actually being put forth, so that the failure in performance is not due, as in aboulia, to defective effort.

In synchiria the bilateral movements, sometimes called synkinesia, bear a decided resemblance to the synkinetic phenomena of organic hemiplegia. Especially is this so in the third variety of synchiria, when the contralateral movement may be less in degree than the homolateral. The two phenomena may, however, be easily distinguished by the other characteristics of each.

Certain respects in which motor allochiria may be misinterpreted were referred to when we discussed this condition, but the errors there mentioned are not likely to be committed at the present day, as the importance of suggestional influence is more widely recognised. In this way, for instance, may be explained Dumontpallier's case [39], in which stimulating one limb caused contralateral contraction of the other.

VI.—DIAGNOSTIC VALUE OF DYSCHIRIA.

In the literature the indications in this direction are but scanty, as might have been expected. Musser's opinion [106] has been quoted above, to the effect that allochiria, when general, should be regarded as a stigma of hysteria, and when local usually occurs with organic disease of the spinal cord. Determann [36] cautiously remarks that when *both* sides of the body are allochiric for *all* sensations one should think of hysteria. Otherwise writers, from Obersteiner [112] to Janet [75], are almost unani-

mous that allochiria is a symptom that may occur in a multitude of affections and is practically valueless in diagnosis.

The evidence, however, is decisive in favour of the view that dyschiria, including allochiria, always represents a psychological affection of a disaggregative nature, and further, there is considerable evidence relating to the "equivalents" of the syndrome which strongly indicates that the disaggregation is of the kind typical of hysteria, and not, for instance, of the less massive kind that I have suggested is present in psychasthenia [82]. It may therefore be concluded that the occurrence of any form of dyschiria should be regarded as a positive indication of the presence of hysteria. I have related elsewhere [81] some of the arguments that may be advanced in favour of this view, and so need not repeat them here.

The clinical importance of the phenomenon is by no means limited, however, to the mere recognition of the presence of hysteria. Observation of its course and variety may be of great service in the matter of prognosis. Naturally the intensity of the dyschiric defect, as shown by the stage present, has a direct value in this connection.

Recognition of the dyschiric process may throw light upon a number of symptoms that would otherwise be misinterpreted as paresis, aboulia, defective sensibility, &c. The great value of this is that it enables a correct analysis to be made of the precise defects present, and serves as a guide towards the original focus of the whole affection, thus proving an important step in that exact psychological diagnosis that is an essential preliminary to the scientific treatment of hysteria. On the therapeutic side the progressive recovery of the functions in question by the aid of careful training may be utilised as a starting point for the general process of intelligent re-education that is the basis of all rational treatment of the affection.

VII.—SUMMARY OF CONCLUSIONS.

(1) Under the name of allochiria two fundamentally different conditions have hitherto been confused. A patient's

mistake in determining the side of a stimulus may be—(i.) part of a general defect in localisation—alloæsthesia, or (ii.) a specific defect independent of any error in localisation—dyschiria. The name allochiria has further been incorrectly applied—as in the terms electromotor and reflex allochiria—to symptoms which are in no way related to either of these conditions.

(2) Dyschiria may be defined as a state in which there is constantly either ignorance or error in the patient's mind as to the side of given stimuli, quite independent of any defect in sensorial acuity or in the power of localisation. This corresponds closely with the definition of allochiria given by Obersteiner, though he did not distinguish the condition from alloæsthesia.

(3) There are three stages of dyschiria: achiria in which the patient has no knowledge as to the side of the stimulus, allochiria in which he refers the stimulus to the corresponding point on the opposite side, and synchronia in which he refers it to both sides; there are three subvarieties of the latter.

(4) All writers subsequent to Obersteiner have abstracted one feature from his definition—namely, the reference of the stimulus to the opposite side—and have used it to define allochiria. It is suggested that the term allochiria be always used in this its current sense, with the important proviso, however, insisted on by Obersteiner, that the symptom is independent of any defect in sensorial acuity or in the power of localisation. The significance of this proviso has been entirely overlooked hitherto, and even Obersteiner did not recognise that a direct corollary of it is the separation of the alloæsthetic error from the allochiric error.

There are seven precise clinical features that enable a differential diagnosis between alloæsthesia and allochiria to be made with certainty.

(5) Alloæsthesia, including false allochiria, is adequately explained by the Head-Spearman hypothesis that it is due to a defect in afferent excitations, particularly those of the "articular" type. It occurs in both organic and functional disease, perhaps most often in tabes.

(6) Dyschiric manifestations may be general in distribution or may relate only to certain segments of the body. There are characteristic introspective, motor, and sensory manifestations of each member of the group. The last mentioned may occur in connection with all varieties of stimuli or with only some. The motor allochiria has been unnecessarily termed "allokinesia." Sensation resulting from stimulation of a dyschiric part has six peculiar attributes, which I have grouped under the designation phrictopathic.

(7) There have been three explanations of allochiria hitherto offered. The Fischer-Hammond hypothesis is throughout contradicted by the facts and should be entirely discarded. The Head-Spearman hypothesis refers to allæsthesia only and had no relation to allochiria. The Head-Janet hypothesis is not borne out by the observations on which this paper is based, which seem to demonstrate that allochiria is independent of any defect in sensorial acuity.

(8) Dyschiria is due to psychical disaggregation and is distinctive of the form of disaggregation characteristic of hysteria. It is primarily an affection of the feeling of "sidedness" (the chirognostic sense).

(9) Of the three stages of dyschiria achiria represents the most severe grade of disaggregation and synchiria the least. These two are essentially transitional forms. Allochiria, on the other hand, is a stable condition which may be present for years.

(10) A number of fallacies in diagnosis are here indicated and especial attention drawn to the close resemblance between unilateral achiria and hemiplegia, particularly hysterical hemiplegia.

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