The Consciousness of Lost Limbs

By William James (1887)

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(Return to index)

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Many persons with lost limbs still seem to feel them in their old place. This illusion is so well known, and the material for study is so abundant, that it seems strange that no more systematic effort to investigate the phenomenon should have been made. Dr. Weir Mitchell's observations in his work on *Injuries of Nerves* (1872) are the most copious and minute with which I am acquainted. They reveal such interesting variations in the consciousness in question, that I began some years ago to seek for additional observations, in the hope that out of a large number of data, some might emerge which would throw on these variations an explanatory light.

The differences in question are principally these:

1. Some patients preserve consciousness of the limb after it has been lost; others do not.

2. In some it appears always in one fixed position; in others its apparent position changes.

3. In some the position can be made to seem to change by an effort of will; in others no effort of will can make it change; in rare cases it would even seem that the very attempt to will the change has grown impossible.

I have obtained first-hand information from a hundred and eighty-five amputated persons. Some of this was gained by personal interviews; but much the larger portion consists of replies to a circular of questions of which I sent out some eight hundred copies to addresses furnished me by some of the leading makers of artificial limbs.[1]

The results are disappointing, in that they fail to explain the causes of the enumerated differences. But they tell certain things and suggest reflections which I here set down for the

use of future inquirers.[2]

First, as to the relative frequency of the feeling of the lost parts. It existed at the time of answering my interrogatories in about three-quarters of the cases of which I have reports. I say in *about* the proportion of cases, for many of the answers were not quite clear. It had existed in a much larger proportionate number, but had faded out before the time of answering. Some had ceased to feel it "immediately," or "an hour or two" after the amputation. In others it had lasted weeks, months, or years. The oldest case I have is that of a man who had had a thigh amputation performed at the age of thirteen years, and who, after he was seventy, affirmed his feeling of the lost foot to be still every whit as distinct as his feeling of the foot which remained. Amongst my one hundred and seventy-nine cases only seven are of the upper extremity. In all of these, the sense of the lost hand remained.

The consciousness of the lost limb varies from acute pain, pricking, itching, burning, cramp, uneasiness, numbness, etc., in the toes, heel, or other place, to feelings which are hardly perceptible, or which become perceptible only after a good deal of "thinking." The feeling is not due to the condition of the stump, for in both painful and healthy stumps it may be either present or absent. Where it is distinct both the lost foot or hand and the stump are felt simultaneously, each in its own place. The hand and foot are usually the only lost parts very distinctly felt, the intervening tracts seeming to disappear. A man, for example, whose arm was cut off at the shoulder-joint told me that he felt his hand budding immediately from his shoulder. This is, however, not constantly the case by any means. Many patients with thigh amputation feel, more or less distinctly, their knee, or their calf. But even where they do not, the foot may seem separate from the stump, though possibly located nearer it than natural. A second shoulder-joint case says his arm seems to lie on his breast, centrally with fingers closed on palm just as it did eight or ten hours before amputation.

It is a common experience, during the first weeks after amputation, for the patient to forget that his leg is gone. Many patients tell how they met with accidents, by rising suddenly and starting to walk as if their leg were still there, or by getting out of bed in the same way. Others tell how they have involuntarily put down their hand to scratch their departed foot. One man writes that he found himself preparing with scissors to cut its nails, so distinctly did he feel them. Generally the position of the lost leg follows that of the stump and artificial leg. If one is flexed the other seems flexed; if one is extended so is the other; if one swings in walking the other swings with it. In a few correspondents, however, the lost leg maintains a more or less fixed position of its own, independent of the artificial leg. One such man told me that he felt as if he had three legs in all, getting sometimes confused, in coming down stairs, between the artificial leg which he put forwards, and the imaginary one which he felt bent backwards and in danger of scraping its toes upon the steps just left behind. Dr. Mitchell tells of certain arms which appeared fixedly in the last painful attitude they had occupied before amputation. One of my correspondents writes that he feels constantly a blister on his heel which was there at the time of his accident; another that he had chilblains at the time of the accident, and feels them still on his toes.

The differences in the apparent mobility of the lost part, when felt, are strange. About a hundred of the cases who feel (say) their feet, affirm that they can "work" or "wiggle" their toes at will. About fifty of them deny that they have any such power. This again is not due to the condition of the stump, for both painful and healthy stumps are found equally amongst those who can and amongst those who cannot "work their toes." Almost always when the will is exerted to move the toes, actual contraction may be perceived in the muscles of the stump. One might, therefore, expect that where the toe-moving muscles were cut off, the sense of the toes being moved might disappear. But this is not the case. I have cases of thigh amputation, in which all the foot-moving muscles are gone, and yet in which the feet or toes seem to move at will. And I have cases of lower-leg amputation in which, though the foot-moving muscles contract in the stump, the toes or feet feel motionless.

But although, in a gross sense, we are thus forced to conclude that neither the state of the stump nor the place of the amputation absolutely determines the differences of

consciousness which different individuals show, it is nevertheless hard to believe that they are not amongst the more important influencing conditions of the illusion which we are studying. On *a priori* grounds it seems as if they must be so. What is the phenomenon? It is what is commonly known as the extradition, or projection outwards, of a sensation whose *immediate* condition is the stimulation of a central organ of perception by an incoming nerve or nerves. As the optical centres respond to stimulation by the feeling of forms and colors, and the acoustic centres by that of sounds, so do certain other centres respond by the feeling of a foot, with its toes, heel, etc. This feeling is what Johannes Müller called the "specific energy" of the neural tracts involved. It makes no difference how the tracts are excited, that feeling of a foot is their only possible response. So long as they feel at all, what they feel is the foot.[3] In the normal state the foot thus felt is located where the eye can see and the hand touch it.

When the foot which the eye sees and the hand touches is cut off, still the immediate inner feeling of it persists so long as the brain-centres retain their functions; and, *in the absence of any counter-motive,* it ought, one would think, to continue located about where it used to be. There would be a counter-motive, if nerves which in the unamputated man went to the foot and were excited every time the foot was touched, were to find themselves, after the amputation, excited every time the *stump* was touched. The foot-feeling (which the nerves would continue to give) being then associated with the stump-contacts, would end (by virtue of a law of perception of which I made mention in *Mind* for 1887, p. 196) by locating itself at the place at which those contacts were believed, on the testimony of the eye and the hand, to occur. In other words, the foot-feeling would fuse with the feeling resident in the stump. In but few cases does this seem to occur;[4] and the reason is easily found. At the places where the amputation is apt to be made, the nerves which supply the foot are all buried deeply in the tissues. Superficial contact with the stump never excites, therefore, the sensibility of the foot-nerves. All ordinary contacts of the stump, thus failing to awaken the foot-feeling in any noticeable way, that feeling fails to grow associated with the stump's experiences; and when (on exceptional occasions) deep pressure of the stump awakens not only its own local cutaneous feeling but the foot-feelings due to the deeper-lying nerve, the two feelings still keep distinct in location as in quality.

There is, usually, in fact, a positive reason against their local fusion. More than one of my correspondents writes that the lost foot is best felt when the end of the stump receives the thrust of the artificial leg. Whenever the old foot is thus most felt at the moment when the artificial foot is seen to touch the ground, *that* place of contact (being both important and interesting) should be the place with which the foot-feeling would associate itself (by virtue of the mental law already referred to). In other words, we should project our foot-feeling upon the ground, as we used to before we lost the member, and we should feel it follow the movements of the artificial limb.[5] An observation of Dr. Mitchell's corroborates this view. One of his patients "lost his leg at the age of eleven, and remembers that the foot by degrees approached, and at last reached, the knee. When he began to wear an artificial leg it reassumed, in time, its old position, and he is never, at present, aware of the leg as shortened, unless for some time he talks and thinks of the stump and of the missing leg, when... the direction of attention to the part causes a feeling of discomfort, and the subjective sensation of active and unpleasant movement of the toes. With these feelings returns at once the delusion of the foot as being placed at the knee."[6]

The latter half of this man's experience shows that the principles I have invoked (though probably quite sound as far as they go) are not exhaustive, and that, between fusion with the stump and projection to the end of the artificial limb, the intermediate positions of the foot remain unaccounted for. It will not do to call them vague remains of the old normal habit of projection, for often they are not vague, but quite precise. Leaving this phenomenon on one side, however, let us see what more our principles can do.

In the first place they oblige us to invert the popular way of looking at the problem. The popular mind wonders how the lost feet can still be felt. For us, the cases for wonder are those in which the lost feet are not felt. The first explanation which one clutches at, for the loss, is that the nerve-centres for perception may degenerate and grow atrophic when the sensory nerve-

terminations which normally stimulate them are cut off. Extirpation of the eyeballs causes such atrophy in the occipital lobes of the brain. The spinal cord has been repeatedly found shrunken at the point of entrance of the nerves from amputated limbs. And there are a few carefully reported cases in which the degeneration has been traced ascending to the cortical centres, along with an equal number of cases in which no such ascending degeneration could be found. [7] A degenerated centre can of course no longer give rise to its old feelings; and where the centres are degenerated, that fact explains all-sufficiently why the lost member can no longer be felt. But it is impossible to range all the cases of non-feeling under this head. Some of them date from the first hours after the operation, when degeneration is out of the question. In some the perceptive centres are proved to be there by exciting electrically the nerve-trunks buried in the stump. "I recently faradised," says Dr. Mitchell, "a case of disarticulated shoulder without warning my patient of the possible result. For two years he had altogether ceased to feel the limb. As the current affected the brachial plexus of nerves, he suddenly cried aloud, 'Oh, the hand, the hand!' and attempted to seize the missing member. The phantom I had conjured up swiftly disappeared, but no spirit could have more amazed the man, so real did it seem."[8]

In such a case as this last, the only hypothesis that remains to us is to suppose that the nerve-ends are so softly embedded in the stump as, under ordinary conditions, to carry up no impressions to the brain, or none strong enough to be noticeable. Were they carried, the patient would feel, and feel a foot. Not feeling the foot, and yet being capable of feeling it (as the faradization proves), it must be either that no impressions are carried, or else that for some reason they do not appeal to consciousness. Now it is a general law of consciousness that feelings of which we make no practicable use tend to become more and more overlooked. Helmholtz has explained our habitual insensibility to double images, to the so-called *muscæ volitantes* caused by specks in the humors of the eye, to the upper harmonics which accompany various sounds, as so many effects of the persistent abstraction of our attention from impressions which are of no use. It may be that in certain subjects this sort of abstraction is able to complete our oblivescence of a lost foot; our feeling of it has been already reduced almost to the vanishing point, by reason of the shielded condition of the nerve-ends, just assigned. The feeling of the lost foot tells us absolutely nothing which can practically be of use to us.[9] It is a superfluous item in our conscious baggage. Why may it not be that some of us are able to cast it out of our mind on that account? Until a few years ago all oculists believed that a similar superfluity, namely, the second set of images seen by the squinting eye in squinters, was cast out of consciousness so persistently that the eye grew actually blind. And, although the competency of the explanation has probably been disproved as regards the blindness, yet there is no doubt that it is quite competent to prove an almost invincible *unconsciousness* of the images cast upon a squinting eye.

Unconsciousness from habitual inattention is, then, probably one factor in the oblivescence of lost extremities,-- a factor which, however, we must regard as unavailing where impressions from the nerve-ends are strong.[10]

Let us next consider the differences in regard to the illusion of voluntary movement in the lost parts. Most of the patients who seem to themselves able to move their lost feet, hands, etc., at will, produce a distinct contraction of the muscles of the stump whenever they make the voluntary effort. As the principle of specific energies easily accounted for the consciousness of the lost limb being there at all, so here another principle, almost as universally adopted by psychologists, accounts as easily for the consciousness of movement in it, and leaves the real puzzle to reside rather in those cases in which the illusion of movement fails to exist.

The principle I refer to is that of the inheritance of ancestral habit. It is all but unanimously admitted at the present day that any two experiences, which during ancestral generations have been invariably coupled together, will have become so indissolubly associated that the descendant will not be able to represent them in his mind apart. Now of all possible coupled experiences it is hard to imagine any pair more uniformly and incessantly coupled than the feeling of effected contraction of muscles, on the one hand, and that of the changed position of the parts which they move, on the other. From the earliest ancestors of ours which had feet, down to the present day, the movement of the feet must always have

accompanied the contraction of the muscles; and here, if anywhere, habit's hereditary consequences ought to be found, if the principle that habits are transmitted from one generation to another is sound at all.[11] No sooner then should the brain-centres for perceiving muscular contractions be excited, than those other centres functionally consolidated with them ought to share the excitement, and produce a consciousness that the foot has moved. If it be objected to this that this latter consciousness ought to be ideal rather than sensational in character, and ought therefore not to produce a fully developed illusion, it is sufficient to point to what happens in many illusions of the same type. In these illusions the mind, sensibly impressed by what seems a part of a certain probable fact, forthwith *perceives* that fact in its entirety. The parts supplied by the mind are in these cases no whit inferior in vividness and reality to those actually impressing the sense.[12] In all perception, indeed, but half of the object comes from without. The larger half usually comes out of our own head. We can ourselves produce an illusion of movement similar to those which we are studying by putting some unyielding substance (hard rubber, *e.g.*) between our back teeth and biting hard. It is difficult not to believe that our front teeth approach each other, when we feel our biting muscles contract.[13] In ourselves the feeling of the real position of the jaws persists unchanged to contradict the false suggestion. But when we recall that in the amputated no such positive contradiction can occur, since the parts are gone, we see how much easier it must be in their case for the false sense of movement to flourish unchecked.[14]

But how, then, comes it that there can be any patients who lack the false sense in question? In one hundred and forty of my cases, about fifty lacked it completely; and even when the stump-muscles contract violently, many patients are unable to feel any change at all in the position of the imaginary extremity. This is not due to the fact that the amputation is made above the origin of the hand-or-foot-moving muscles; for there are eleven cases where these muscles remain and contract, but yet no sense of movement exists. I must say that I can offer no clear solution of this anomaly. It must be left over, together with those obstinate cases of partial apparent shortening of which we spoke above, for future investigators to treat.

One reflection, however, seems pertinent to the entire set of phenomena we have studied. They form a group in which the variations from one individual to another, if they exist at all, are likely to become extreme. notices that no organs in animals are so subject to variation as rudimentary organs. Being functionless, selection has no hold on them, the environment exerts no influence to keep them up (or down) to the proper standard, and the consequence is that their aberrations are unchecked. Now phantasms of lost legs and arms are to the mental organism just what rudimentary organs are to the bodily organism. They have no longer any real relations with the environment, being mere vestiges of something which formerly had real relations. The environment does not correct such a phantasm for any odd course it may get into. If it slips away altogether, the environment lets it go, and doesn't call it back. If it happen "by accident" to harden itself in a fixed position, or shorten itself, or to dissolve connection with its ancestral associates in the way of muscular feeling, the accident is not repaired; and experience, which throughout the rest of our mental life puts prompt bounds to too great eccentricity, here lets it luxuriate un-rebuked. I do not know how far one ought to push this idea. But (what we can call by no better name but) accident or idiosyncrasy certainly plays a great part in all our neural and mental processes, especially the higher ones. We can never seek amongst these processes for results which shall be invariable. Exceptions remain to every empirical law of our mental life, and can only be treated as so many individual aberrations. It is perhaps something to have pointed out the department of lost-limb-consciousness as that in which the aberrant individuals are likely to reach their maximum number.

The apparent changes of temperature of the lost parts form an interesting chapter, which, however, I will not discuss. Suffice it to say, that in many patients the lost foot can be made to feel warm or cold by warming or cooling the stump. A draught of air on the stump produces the feeling of a draught on the foot. The lost foot also sympathizes sometimes with the foot which remains. If one is cold, the other feels cold. One man writes that whenever he walks through puddles and wets his sound foot, his lost foot feels wet too.

My final observations are on a matter which ought to interest students of "psychic

research." Surely if there be any distant material object with which a man might be supposed to have clairvoyant or telepathic relations, that object ought to be his own cut-off arm or leg. Accordingly, a very wide-spread belief will have it, that when the cut-off limb is maltreated in any way, the man, no matter where he is, will feel the injury. I have nearly a score of communications on this point, some believing, more incredulous. One man tells of experiments of warming, etc., which the doctor in an adjoining room made on the freshly cut-off leg, without his knowledge, and of which his feelings gave him no suspicion. Of course, did such telepathic *rapport* exist, it need not necessarily be found in every case. But in none of the cases of my collection in which the writers seek to prove it does their conclusion inspire confidence. All (with perhaps one exception which, unfortunately, I have lost) are vaguely told; and, indeed, amongst all the pains which come and go in the first weeks of amputation, it would be strange if some did not coincide with events happening to the buried or "pickled" limb. One man writes me that he has dug up his buried leg eight times, and changed its position. He asks me to advise him whether to dig it up again, saying he "dreads to."

In concluding, I repeat that I have been able to throw no new light of a positive sort on those individual differences, the explanation of which was the aim of my inquiry. I have, perhaps, by invoking certain well-known principles, succeeded in making the fundamental illusions, that of the existence, and that of the movement of the lost part, seem less paradoxical, and the exceptions to these illusions less odd than they have hitherto appeared. But, on the whole, I leave the subject where I took it up from Dr. Weir Mitchell's hands; and one of the main effects of the investigation on my own mind is admiration for the manner in which he wrote about it fifteen years ago.

Footnotes

[1] For these addresses I have to thank Messrs. Fisk & Arnold, of ; Marks, and Wicker & Bradley, of ; Clement, and Osborne, of ; and Douglass, of

[2] One lesson from them is that in a delicate inquiry like this, little is to be gained by distributing circulars. A single patient with the right sort of lesion and a scientific mind, carefully cross-examined, is more likely to deepen our knowledge than a thousand circulars answered as the average patient answers them, even though the answers be never so thoroughly collated by the investigator. This is becoming apparent in many lines of psychological inquiry; and we shall probably, ere long, learn the limits within which the method of circulars is likely to be used with fruit.

[3] It would seem that, even in the case of congenital defect of the extremities, the brain-centres might feel in the usual ancestral way. "A nineteen-year-old girl and a man in the forties, who had each but one normal hand, the other, instead of fingers, having only little prominences of skin without bones or muscles, thought they bent their absent fingers when they bent the deformed stump. Tickling these eminences, or binding a string about the fore-arm, caused the same sensations as in amputated persons, and a pressure on the ulnar nerve made the outer fingers tingle. In the same way persons born with a much shortened arm have stated the length of this member to be greater than it really was. An individual whose right fore-arm almost entirely failed, so that the dwarfed hand seemed to spring from the elbow, was conscious of the misshapen arm as normal and almost as long as the other." I quote this remarkable passage from Valentin's *Lehrbuch der Physiologie des Menschen,* Vol. II, p. 609. Valentin gives a number of references to the contemporaneous literature of the subject, and his own remarks, which occupy several pages, are well worth reading, even now.

[4] I have found none. Dr. Mitchell reports one at least, in which the lost hand lay "seemingly *within* the stump" (p. 356 Cf. also p. 151)· This was an upper-arm amputation.

[5] The principle here is the same as that by which we project to the extremity of any instrument with which we are probing, tracing, cutting, etc., the sensations which the instrument

communicates to our hand when it presses the foreign matter

with which it is in contact.

[6] *Injuries* of *Nerves,* , 1872, p. 352

[7] François-Franck: *Leçons sur les fonctions motrices du cerveau,* 1887, p. 291.

[8] *Op. cit.* p. 349

[9] Except the approach of storms; but then it is in cases where the feeling is preserved.

[10] I have quoted my hundred and forty-odd patients as feeling their lost member, as if they all felt it *positively.* But many of those who say they feel it seem to feel it *dubiously.* Either they only feel it occasionally, or only when it pains them, or only when they try to mol·e it; or they only feel it when they "think a good deal about it" and make an effort to conjure it up. When they "grow inattentive," the feeling "dies back," or "jumps back to the stump." Every degree of consciousness, from complete and permanent hallucination, down to something hardly distinguishable from ordinary fancy, seems represented in the sense of the missing extremity which these patients say they have. Indeed I have seldom seen a more plausible lot of evidence for the view that imagination and sensation are but differences of vividness in an identical process, than these confessions, taking them altogether, contain. Many patients say they can hardly tell whether they feel or fancy the limb.

[11] In saying that if it is sound, then the explanation which I offer follows, I wish to retain reserved rights as to the general question of its soundness, regarding which evidence seems to me as yet somewhat incomplete. But the explanation which I offer could base itself on the invariable associations of the individual's experience, even if the hereditary transmission of habitual associations proved not to be a law of nature.

[12] They are vivid and real in proportion to the inveterateness of their association with the parts which impress the sense. The most perfect illusions are those of false motion, relief, or concavity, changed size, distance, etc., produced when, by artificial means, an object gives us sensations, or forces us to move our eyes in ways ordinarily suggestive of the presence of an entirely different object. We *see* then the latter object directly, although it is not there. The after-image of a rectangular cross, of a circle, change their shapes when we project them on to an oblique surface; and the new shape, which is demonstrably a reproduction of earlier sense-impressions, feels just like a present sense-impression.

[13] See for another example *Sternberg,* in Pflüger's *Archiv*, Bd. 37, S.·1.· The author even goes so far as to lay it down as a general rule that we ordinarily judge a movement to be executed as soon as we have given the impulse.

[14] Out of the ninety-eight of my cases who feel their limbs to move, there are forty-three who can produce no feeling of movement in the lost extremity without visibly contracting the muscles of the stump. But (leaving out doubtful cases) twelve of the others positively affirm that, after the most careful examination, no contractions can be detected in the stump, whilst yet the extremity seems to move at will. One such case I observed myself. The man had an amputation of the upper arm. He seemed to himself to flex his fingers at will; but I could perceive no change whatever in the stump. The thought of the movement seemed here a sufficient suggestion; as in those anæsthetic cases where the patient thinks of a movement and wills it, and then (if his eyes are closed) fancies it executed, even though the limb be held still by the bystanders.

Questionnaire on Consciousness of Lost Limbs

(Reprinted as Appendix II of James, W. (1983). *Essays in Psychology*. Harvard.

DEAR SIR OR MADAM,

I am engaged in scientifically studying the peculiarities of sensation experienced by amputated persons in their lost limbs.

As the information I require can only be obtained by the statistical method of collecting and comparing a very large number of the facts in point, I trust you will not deem it too great a liberty if I beg you to communicate to me some details from your personal experience. All such communications shall be regarded as confidential, and no personal details will be published without the express permission of the writers.

In answering the following questions, please bear in mind that an inaccurate answer is, for scientific purposes, a great deal worse than no answer at all. Some of the questions may for certain individuals be difficult to answer with precision. In such cases, a statement that the answer is difficult, and if possible, of the precise nature of the difficulty, will satisfy the purposes of the inquiry quite as much as the most definite reply.

Will you then, to the best of your ability, answer the questions, each in the blank space left below it?

1. Your name, age, and address.

2. Date of amputation, and part lost.

3. Do you still feel the lost part) If you do not feel it now, for how long did you feel it after the amputation?

4. How much of the limb can you feel, and how does the feeling differ from what it would be if the member were present?

5. Does the limb appear shortened?

Does it appear in a fixed position?

If not, does the apparent position change from time to time?

6. If the apparent position changes of its own accord, can you assign any cause for such change?

Does it follow the position of the stump?

When you walk, does the *lost leg* seem to swing in alternation with the sound leg, just as it would if there?

Do you ever feel as if you had *two* imaginary legs in addition to a real one?

7. Can you, by consciously directing your attention to the lost part, change the intensity or quality of the feeling there?

8. Can you, by *imagining* strongly that it has moved, make yourself really feel as if it *had* moved into a different position?

9. Can you, by making an *effort of the will*, succeed in making it seem to move into a different position? (Do you recognize as two distinct cases, *imagining* the change, and *willing it?*)

10. If you *cannot* make it seem to move, is this because, *in spite of your effort,* the movement seems not to take place?

Or is it rather because of a difficulty you experience in *making* the voluntary effort towards a part that no longer exists? If you cannot even make the effort, will you kindly take great pains to describe why; and if you can't describe why, try to say what makes such description difficult.

11. *If,* on the other hand, you *can* succeed in voluntarily making the lost part seem to change its position, will you accurately ascertain whether the feeling you get of the change be not perhaps due to actual contractions you are producing in the muscles, "nerves," or "cords," of the stump, and which you mistake for feelings of motion in the lost part? In other words, are you entirely sure that your feeling of change goes *beyond the stumpf?*

12. If you are entirely sure that your feeling of the moving lost part is *additional* to the feeling you simultaneously get in the stump, will you ascertain whether you can get this feeling of motion in the lost part *without any actual movement occurring in the stump?* (As this is a rather delicate fact to be sure of, it is hoped that you will test it several times, with the stump uncovered, and held in your own or some one else's hand, so that very faint internal movements in it may not escape notice if they exist.)

13. If you *can* make the lost part seem as to move in obedience to your will, whilst the muscles in the stump are absolutely at rest, will you endeavor to describe the difference (if you feel any) between this way of willing an illusory movement, and the way of willing a real movement in the limb on the other side, corresponding to the one you have lost.

14· Will you add any remarks or reflections connected with the subject) In particular, do you believe you felt in any way the situation or condition of your actual diseased limb after it had been cut off, buried, &c.?

Please receive, in advance, the thanks of

WILLIAM JAMES,

Assistant Professor of Philosophy, .

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