spinatus and teres minor muscles; the folds of the axilla, the subscapular and the anterior portion of the deltoid, would then act almost unopposed, and draw the head of the bone forcibly inward against the inner part of the neck of the scapula—and if by chance the inner border of the glenoid cavity be broken (which is not impossible), the head of the arm bone would pass farther inward, and beneath the coracoid process, amounting nearly to an actual displacement, just as displacement of the head of the femur will result in consequence of a fracture of the acetabulum. How such a state of things could take place consistently with our present knowledge of the matter, we are unable to say. It may be that we have not a true history of the cause of the injury.

In conclusion, we cannot better end this report, than in the excellent remarks of Sir A. Cooper, upon the difficulty of these injuries. He says, "These cases should lead the members of our profession to be kind, generous, liberal towards each other, and not to impute to ignorance or inattention, that which is the result of a generally incurable accident. It too often happens, that when any trial has been made to restore the parts, and without success, the patient goes to some other surgeon, to whom he shows the arm and points out its uselessness and want of motion. A jealous and illiberal medical man might say, 'yes, this is a dislocation, which has not been reduced; I wish I had seen it at first; but now it is too late for a successful attempt to reduce it.' However, every well-informed surgeon will now confess that no knowledge or exertion of skill could have prevented the deformity and loss of the natural motions which result from this formidable accident."

FORMIC ACID IN THE BLOOD.—DR. JACKSON'S REPLY TO DR. LEE.

[Communicated for the Boston Medical and Surgical Journal.]

MESSRS. EDITORS,—My attention has been called to a communication in your Journal of this day, signed Charles A. Lee, M.D., in which he continues to discuss theoretically some facts ascertained and published by me concerning the fatal effects of chloroform, in a case of death produced by its inhalation. Although Dr. Lee has not complied with my requisition, that he should extract from healthy blood, by simple distillation, a few drops of formic acid, and by so doing invalidate, in part, my results, and is not in a position to be regarded as an authority in the question he has raised, I shall meet his objections by stating the facts of the case, and shall leave his arithmetical computations, and chemical symbols, for the edification of younger chemists and physiologists.

Dr. Lee does not seem to understand the case under discussion; and it may be that in simply stating the results obtained by me, I did not clearly set forth my reasons for the conclusions at which I arrived.

With regard to my declining correspondence with anonymous wri-

ters, I certainly have a right to neglect such irresponsible authors; hence I do not see why a refusal on my part, to enter upon a discussion of scientific matters with such correspondents, should be a source of complaint. Nor do I see what any former discoveries or opinions of mine, on other matters, have to do with the case now before us. It is true that I discovered, as Dr. Lee alleges, some two years since, that fusel oil, and some of the products of its decomposition, found in chloroform, made from whiskey, are fatal to life when inhaled. This discovery was verified at the time by myself, and subsequently by Dr. Brown-Séquard, who was then lecturing in Boston. It was then and still is believed, that the presence of these products of amyl will account for some of the known deleterious effects of impure chloroform. I have since discovered that even pure chloroform is capable of so altering the nature of the blood, as to prevent its acting as a vital fluid.

The error under which Dr. Lee most labors, is in not appreciating the changes which the blood undergoes by taking chlorine in the place of the oxygen, which it loses when it is decomposed by the action of chloroform, the latter resolving itself, under these circumstances, into formic acid, while the chlorine combines permanently with the blood. He also seems to overlook the fact that the oxygen of the blood, in the lungs at the time the chloroform was inhaled, was *suddenly* removed by the action of the chloroform, so that the immediate *working blood* (if we may use that expression to designate the blood at the moment in action in the heart and lungs) was not only *deoxygenated*, but was actually *chlorinized* and rendered incapable of absorbing oxygen. Dr. Lee may be assured that these facts were fully proved by the inquest, or they would not have been stated by me in a published communication.

Even were it proved that *traces* of formic acid are found in sweat and in blood of some animals, I do not see that such facts will reach our case or explain the chemical changes which the blood underwent in the case I have reported.

That formic acid is *produced* by the oxidation of starch and various other vegetable substances, is well known to me and to all chemists; but we know, also, that *such changes never take place spontaneously*.

To show that blood contains the elements of formic acid, and to figure how they might be brought together to make it, when no such action ever takes place, is a mere waste of argument and an abuse of chemical symbols. So also is all the cyphering about the equivalency of chlorine, formic acid, silver and nitric acid, a vain display. It would be equally edifying to cypher out the quantity of hydrocyanic acid, which the blood of a man would *produce*, if it should, by some miraculous change, be converted into that deadly poison. If the chemist should obtain hydrocyanic acid by distillation of the blood of a poisoned man, at a proper temperature, such a computation as would prove that it could theoretically be compounded from the blood would be of little avail as evidence.

Dr. Lee is in error when he supposes that I regarded asphyxia as the effect of the presence of formic acid in the blood. I never made any such statement. What I said was, as above reiterated, that the sudden withdrawal of oxygen from the blood by the conversion of ter chloride of formyl into ter oxide of formyl, the blood furnishing the oxygen for this purpose, while the chlorine combined with the blood, might account for the asphyxia of which the patient is proved to have died.

I ascertained, by experiments on the blood taken from the heart, that it was incapable of absorbing oxygen from the air; that it contained combined chlorine and not chloroform, and that formic acid was present in sensible quantities and was readily separable by simple distillation. Now if Dr. Lee knows more about a case he has never investigated, than the accomplished physicians who made the autopsy, and the chemist who made the analytic researches, or the jury that passed upon the case, let him testify.

CHARLES T. JACKSON, M.D.

Boston, April 17, 1856.

Bibliographical Notices.

Manual of Chemical Physiology. From the German of Prof. C. G. LEHMANN, M.D. Translated by J. CHESTON MORRIS, M.D.; with *An Essay on Vital Force*, by SAMUEL JACKSON, M.D., Prof. of Institutes of Medicine in the University of Pennsylvania, &c. Illustrated with forty Wood Cuts. Philadelphia: Blanchard & Lea. 1856. pp. 331.

Of which of Dr. Lehmann's works this is a translation, the title by no means evinces. This celebrated chemist and physiologist published, about fifteen years since, his "*Text-Book of Physiological Chemistry*." From a later German edition, published in 1850, an American edition has recently been issued by Blanchard & Lea, in two volumes, under the auspices of Prof. Rogers, of the University of Pennsylvania. The work before us, entitled "*Chemical Physiology*," in one large octavo volume, is a translation of the "*Hand-Book of Physiological Chemistry*," a smaller work and more elementary than the "*Text Book*," and, in its condensed form, necessarily containing less matter, and treating generally, rather than minutely, of the chemical properties of the animal tissues and secretions.

The translator has incorporated notes from the lectures of Dr. Samuel Jackson, of Philadelphia, and extracts from the works of Carpenter, Todd, Bowman and Kolliker, illustrating, more particularly than in the original, certain anatomical and physiological points. These additions, he thinks, have so changed the character of the original manual, as to render the title "*Chemical Physiology*" more applicable than that of "*Hand-Book of Physiological Chemistry*."

In the study of the properties of living bodies, the junctions of chemistry and physiology are necessarily so intimately blended, that it is very difficult to draw a line between the teachings of either. The translator, in this instance, however, hardly seems to have been authorized in making this change in the title of the book, simply because the anatomy of the parts, and their uses, may have been given in greater detail than in the original.