INTRAMUSCULAR INJECTIONS ANATOMICALLY CONSIDERED[1]

MANY studies of the injection of medicinal substances into the muscle masses of the human body have been made, but, for the most part, they have considered the avoidance of vessels and nerves and the rate of absorption of the introduced substances.

In our study we have concerned ourselves primarily with the relation of the immediate distribution of the substance injected to the structure of the muscle and its associated connective tissues. For our study we used cadavera selected from the anatomical material received by the University of Cincinnati during the past two years. The intramuscular injections were made into both fresh and preserved cadavera. We have examined dissections, frozen sections and roentgenograms. For injection material we have used aqueous dye solutions, colored mineral oil, vegetable oils, varnish solutions and pharmaceutical preparations, such as iodized oil, brominized oil and grey oil. We have found no essential differences in the behavior of any of the above upon injection.

In every case, *no matter what the direction of the injecting needle,* the introduced solution traveled in the direction of the muscle fibers. Large quantities of injected material and great pressures tended to obscure but did not obliterate the pattern. In muscles with large fasciculi and heavy intramuscular septa the picture is very evident. In the gluteus maximus the injected mass spread to the dependent portion along the muscle fibers. In the usual prone position of the cadaver this is lateralward and in the general direction of the trochanter major.

In other words: the distribution of substances introduced by intramuscular injection takes place along the lines of least resistance. It differs in no wise from the spread of pyogenic material along muscle fasciculi and in fascial compartments—an occurrence which is so well known from numerous studies made on the forearm.

As a *practical* conclusion of our investigation we would recommend that intramuscular injections be made with the shaft of the needle parallel with the general direction of the muscle fibers and with the point directed downward, *i.e.,* towards the dependent portion. In the case of the muscles which are frequently selected (deltoid, triceps, gluteus maximus) our recommendations automatically secure the avoidance of large vessels and nerves.

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[1] Preliminary note.

NOMENCLATORIAL STATUS OF THE AMEBAS MAYORELLA BIGEMMA AND M. (?) DOFLEINI

THE two species of amebas mentioned in the title of this note are stated to be synonymous by Johnson.[1] The cause of this synonymy he apparently presumes arose out of my having overlooked the paper in which the author (Neresheimer) of *dofleini* described this species when I published my description of *bigemma.* I did not overlook the paper in question but read it carefully before I published my description of *bigemma* and again now. I did not quote the paper because the species *dofleini* described therein did not seem sufficiently closely related to *bigemma* to warrant it. The chief reasons for regarding these two species as differing from each other specifically in a thoroughgoing manner are set forth in a brief article in a forthcoming number of *The American Naturalist.*

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HUMIDITY AND SONG

PROFESSOR VUILLEMIER'S jocular note in SCIENCE for June 15 may have more truth than the general reader realizes. I have long observed that there is a definite relation between the frequency of song of the western meadowlark (*Sturnella neglecta*) and the humidity of the air. This meadowlark sings most frequently when the air has a relatively high humidity. Its song is much less frequent in the arid summer season than in the winter. The bird is heard at Riverside most frequently in winter just before or after a rain and sings readily in cloudy, misty weather. Dr. Ritter[1] mentions that the song of this bird is heard in the moist littoral region at La Jolla every month in the year, and that its frequency is greatest in the morning and evening.

There seem to be good reasons for believing that the singing of the western meadowlark is conditional upon the moisture content of the air.

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QUOTATIONS

TRAVELING EXPENSES AND THE INCOME TAX

TRAVELING expenses incurred by physicians in attending meetings of medical associations are deductible in the computation of their federal income taxes. The Commissioner of Internal Revenue has erred in

[1] SCIENCE, July 27, 1928, p. 84.

[1] "The Unity of the Organism," p. 260, Vol. 2.

denying the deductibility of such expenses. The Board of Tax Appeals made this decision, October 2, in passing on the appeal of Dr. Cecil M. Jack, of Decatur, Illinois.[2] The decision becomes final at the expiration of six months from its promulgation unless an appeal is taken to the courts before that time. The commissioner did not appeal, however, when the Board of Tax Appeals rendered similar decisions against him in favor of ministers[3] and of chemists,[4] in cases identical in every essential circumstance with the present case. In those decisions the commissioner officially acquiesced, without waiting for six months to expire, and there seems to be no reason why he should follow a different course now. Acquiescence seems more probable, too, since the board, in promulgating its decision in the present case, cited as precedents the very cases in which the commissioner had acquiesced, and repudiated as a precedent a decision of the board[5] by which the commissioner undertook to justify his course. In that case, the board pointed out, it was necessary for the board to uphold the commissioner's denial of the physician's claim of the right to deduct traveling expenses, because the physician had not submitted proofs of the amounts expended. The only discoverable result that would follow an appeal by the commissioner is added expense and trouble to the taxpayer and to the government, an additional case to clog the court calendar, and, pending a decision by the court, many thousands of payments unlawfully exacted of physicians under the guise of taxation, to be added to the tens of thousands of such payments already exacted, all of which the government may be called on to refund.

Since the Commissioner of Internal Revenue first denied to physicians their right to deduct traveling expenses, in 1922, the medical profession has paid probably as much as a half million dollars into the treasury, to avoid unlawful demands by the commissioner, the distraint of property and suits. Subject to certain limitations on the time within which claims for refunds must be filed, all of this money will be repayable to the physician who paid it, if the courts are not called on within six months to reverse the decision of the Board of Tax Appeals and if on appeal they sustain the decision of the board.

Applications for refunds may be filed without waiting for any further official action in the case. Claims for refunds for the tax years 1924 and 1925 must be made within four years from the date of payment; for the tax years 1926 and 1927, within three years, and for the tax year 1928, within two years. Unfortunately, in many individual cases the amounts repayable are probably so small that the physician will not feel justified in going to the trouble and expense of making a claim, and in many cases it will be difficult at this late date to produce adequate legal proof of the exact amounts paid for railroad fares, Pullman accommodations, hotel accommodations, meals and other allowable expenses. Applications for refunds must be made on the special form provided for that purpose,[6] copies of which can be obtained from the local collector of internal revenue. A separate application must be made for each year for which a refund is claimed. Every application must show that it is based on the decision of the Board of Tax Appeals in Jack *vs.* Commissioner of Internal Revenue.[7] Applications must be filed with the collector of internal revenue within whose district the refundable money was paid.—*Journal of the American Medical Association.*

[2] Appeal of Cecil M. Jack, Docket numbers 14995 and 17662, decided, Oct. 2, 1928.

[3] Appeal of Marion D. Shutter, 2 B. T. A. 23.

[4] Appeal of Alexander Silverman, 6 B. T. A. 1328.

[5] Appeal of Everett S. Lain, 3 B. T. A. 1157.

[6] Internal Revenue Service, Form 843.

[7] Appeal of Cecil M. Jack, Docket numbers 14995 and 17662, promulgated, Oct. 2, 1928.

SCIENTIFIC BOOKS

Animal Ecology. By CHARLES ELTON. New York. The Macmillan Company, 1927. Pp. xx, 207, pls. I–VIII, diagrams in text 1–13.

To out-of-doors biologists Elton's book should make a strong appeal. The author makes the point that the discoveries of Darwin, who was a magnificent field naturalist, had the remarkable effect of driving the scientists indoors, where they remained hard at work for fifty years or more "and whence they are now beginning to put cautious heads again into the open air." It is unfortunate, as Elton says, that almost a third of zoology has been so sadly neglected. The present work ought to do much to interest students in this neglected third—ecology—which, as Elton says, is simply another name for scientific natural history.

The author explains he has laid a good deal of emphasis on practical bearings, partly because many of the best observations are made by economic workers, "partly because the principles of animal ecology are seldom if ever mentioned in zoological courses in the universities, in spite of the fact that it is just such knowledge which is required by any one who is brought up against practical problems in the field, after he leaves the university."

One of the difficulties in ecology has been and is the lack of clearly conceived coordinating principles. The employment, in plant ecology, of "succession," "dominance," "reaction" and other concepts has been very