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.

KARL G. ZWICK
O. V. BATSON

DEPARTMENT OF ANATOMY,
UNIVERSITY OF CINCINNATI

[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.*

A. A. SCHAEFFER

UNIVERSITY OF KANSAS

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.

H. S. REED

CITRUS EXPERIMENT STATION,
RIVERSIDE, CALIFORNIA

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.