noted above and others like them are more likely to have been formed as a result of the lateral escape of earthly material in front of a downward plunging giant meteorite and the rebound that followed its impact.

J. D. Boon
C. C. Albritton, Jr.
Southern Methodist University,
Dallas, Texas

THE NON-UTILIZATION OF LACTIC ACID BY THE LACTATING MAMMARY GLAND

It was first reported by Graham,[1] working with goats, that the lactating mammary gland utilized lactic acid. This was apparently confirmed by Shaw, Boyd and Petersen[2] on lactating cows. Both studies were based on the decrease in blood lactic acid in the passage of the blood through the mammary gland. More recently a criterion of the excitability of the animal was made available by the finding,[3] based on hemoglobin values, that any disturbance of the animal was invariably reflected in a considerable change in the concentration of the blood traversing the gland; whereas in the quiet animal there were little or no detectable blood concentration changes.

This report deals with a re-examination of the role of blood lactic acid in milk secretion based on arteriovenous differences of the lactic acid of blood in its passage through the mammary gland. Lactic acid was determined by a modification of the method of Barker and Summerson.[4] In 17 experiments in which the concentration of the blood traversing the mammary gland was less than 0.5 per cent. and the animals showed no apparent excitation, there was a mean arteriovenous lactic acid difference of only 0.52 mg. per cent. The standard error being 0.32, the difference is not significant. In 17 experiments, in which the blood concentration in the gland exceeded 0.5 per cent. and the animals were obviously excited, there was an apparent utilization of 2.4 mg. per cent. of lactic acid. The standard error of 0.70 demonstrates that this difference is highly significant and indicates that the reported utilization of lactic acid by the active gland was only an apparent utilization due to excitation.

The mean of the arterial lactic acid values of the animals in the excited group was 10.1 mg per cent.; whereas that of the quiet group was only 7.3 mg per cent. It is believed that the apparent utilization with excitation is due to a sudden concentration of lactic acid in the blood in which there is a diffusion of lactic acid into the glandular tissue, resulting in a temporary disproportion in the lactic acid concentration of the blood passing through the gland. This is further substantiated by experiments on both cows and goats under nembutal anesthesia. Arteriovenous samples drawn 10 to 15 minutes after placing the animals under anesthesia, at which time the blood lactic acid was still high due to excitation, showed an apparent utilization of from 2.6 to 7.7 mg per cent. of lactic acid. Samples drawn after the animals were under anesthesia 30 to 45 minutes, at which time the blood lactic acid approached normal, showed no utilization. It is concluded that the lactating mammary gland does not normally utilize blood lactic acid. A more extensive account of this work will be published soon.

Ross C. Powell, Jr.
J. C. Shaw
Department of Dairy Industry,
Storrs Agricultural Experiment Station

1 W. R. Graham, Jr., *Jour. Biol. Chem.*, 122: 1, 1937.

2 J. C. Shaw, W. L. Boyd and W. E. Petersen, *Proc. Soc. Biol. and Med.*, 38: 579, 1938.

3 J. C. Shaw and W. E. Petersen, *Proc. Soc. Biol. and Med.*, 42: 520, 1939.

4 S. B. Barker and W. H. Summerson, *Jour. Biol. Chem.*, 138: 535, 1941.

AN ENDORSEMENT OF THE USE OF GENERIC NAMES AS COMMON NOUNS

Certain advantages in the use of generic names as common nouns, when the species is clearly understood, were discussed recently by Dr. S. O. Mast (Science, 96: 252, 1942); *e.g.*, the use of "some paramecia" instead of "some specimens of *Paramecium*" or "some *Paramecium*." The second phrase, as Dr. Mast points out, comes to be burdensome and repetitious; the third, as he explains, involves a grammatical error and a taxonomic invalidity, in that there is and can be only one *"Paramecium,"* namely, the single protozoan genus *Paramecium.*

In spite of the advantages cited—economy of printed space, avoidance of burdensome phraseology and elimination of grammatical inaccuracies—some authors and editors are distinctly reluctant to use generic names as common nouns. As an extreme case of such reluctance I may mention a personal experience. A paper that I submitted to a British journal was adjudged unacceptable because of my use of the expressions "an amoeba" and "the amoebae." Only upon the capitalization of the initial letter of "amoeba" and "amoebae" was the paper accepted, although "amoeba," with plural "amoebae" or "amoebas," is recognized as a common noun in the Oxford Dictionary, and hence there is no need to capitalize it.

In my work on *Didinium* and other protozoan genera, I have consistently used the generic name as a common noun, preferring in the interest of brevity "ten didinia" to "ten specimens of *Didinium*," and in the interest of grammar the constructions "ten didinia" and "the didinia were" to "ten *Didinium*" and "the *Didinium* were." Nevertheless, expressions identical in form to the last-mentioned two are to be found in current protozoological literature.

Actually, there is nothing new or radical in the use of generic names as common nouns. The practice is adequately supported by the authority that precedent invariably confers. For example, the following are some common animal names (hence common nouns) that are accepted in Webster's New International Dictionary, second edition: alligator, amoeba, arbacia, bison, hippopotamus, paramecium, rhinoceros and stentor. Yet each of these common names becomes a generic name when written with a capital initial letter and preferably italicized, though editorial practice varies with reference to italics; in other words, each is a generic name used as a common noun. In the plant world cases are even more numerous because of the wide popular interest in gardening and horticulture; *e.g.*, acacia, chrysanthemum, geranium, narcissus, rudbeckia and rhododendron. In the use of these and similar common names in scientific writings, it is merely necessary for the author to make clear what species is under consideration.

In view of the convenience which the practice embodies and the sanction which precedent has already conferred on it with reference to many of the more widely known animals and plants, there seems to be no logical reason for investigators and editors to look with disfavor on an author's judicious use of a generic name as a common noun.

C. D. BEERS

WILSON ZOOLOGICAL LABORATORY,
UNIVERSITY OF NORTH CAROLINA

SCIENTIFIC BOOKS

APPLIED MATHEMATICS

Operational Methods in Applied Mathematics. By H. S. CARSLAW and J. C. JAEGER. Oxford: Clarendon Press. 1941.

THE title of this book might give a better indication of its contents if the words "Avoidance of" were prefixed thereto. For, the outstanding virtue of the book is that it dispels the mysticism formerly attached to the so-called operational calculus. After a brief introductory chapter tracing the historical development of the subject and giving due recognition to Heaviside, the real originator of the method, no further use of operators as such appears. Thus the book serves to put the subject on a firm basis in such a clear and simple way that even a student who is not too familiar with mathematics can learn the technique and understand the underlying theory.

The fundamental tool for the elimination of the operational method is the Laplace transform

$$x^*(p) = \int_0^\infty e^{-pt}x(t)\,dt,$$

which "carries" the function $x(t)$ into its "transform" $x^*(p)$. To solve an ordinary linear differential equation with constant coefficients in the unknown function $x(t)$ one transforms the equation by the above integral. Due to the fact that the transform of the derivative $x'(t)$ differs from $p\,x^*(p)$ by a constant (which is determined by the boundary conditions) the differential equation is transformed into an algebraic equation in $x^*(p)$. After solving this it remains only to discover the function $x(t)$ from its transform. In the first chapter this is done by use of a table of the simpler Laplace transforms. Verification of the validity of the process is left for a later chapter. Many examples and exercises are given so that the technique of the method can be thoroughly mastered.

After several applications to physical problems the authors return in Chapter IV to the theory behind the method. With a minimum of the theory of the Laplace integral and the elements of the calculus of residues they show that the method always gives a solution in the linear case described above. Partial differential equations are next treated. Here the Laplace transform serves to reduce the number of variables by one. Thus a differential equation in two independent variables becomes an ordinary equation after the transformation. For partial equations no general validity theorem is established, but each solution is verified directly. The remainder of the book consists of applications to heat conduction, hydrodynamics, various electrical, mechanical and wave problems.

The book strikes an excellent compromise between the rigor required in a mathematical text and the technical skill demanded by the engineering student. Ideals of precision are established by setting forth the foundations strictly. Then later verifications are left to the student who has caught the feeling for careful mathematical procedure. In this connection it might be in order to express regret that the difficult problem of the uniqueness of solutions is not at least mentioned. It is further to be deplored that in a book of this character there should be no mention of the Stieltjes integral. This integral is so obviously the correct tool for physical problems that it is difficult to understand why it has not found its way into physics texts. By its use the somewhat apologetic discussion of "impulsive functions" in Appendix III could be replaced by something less distasteful to the