Dische's figure was arrived at when using phospho-tungstic acid as the protein precipitant.

The 'bound sugar' of the blood may have a physiological significance (Glassmann; *Zeit. physiol. Chem.*, **150,** 16, and **158,** 113).

A further communication on this subject will be published shortly.   CLAUDE RIMINGTON.

Biochemical Department,
Wool Industries Research Association,
Headingley, Leeds, Nov. 4.

Natural Selection Intensity as a Function of Mortality Rate.

IN NATURE of May 31, Prof. Salisbury points out that most of the mortality among higher plants occurs at the seedling stage, and concludes that natural selection is mainly confined to this stage. I believe, however, that this apparently obvious conclusion is fallacious, for the following reason:

Consider two pure lines A and B originally present in equal numbers, and with a common measurable character, normally distributed according to Gauss's law in each group. Let the standard deviations of the character be equal in each group, but its mean value in group A slightly larger than that in group B. Johanssen's beans furnish examples of this type of distribution. Now let selection act so as to kill off all individuals in which the character falls below a certain value. I think that this type of artificial selection furnishes a fair parallel to natural selection, in which chance commonly plays a larger part than heritable differences. Let x be the proportion of individuals eliminated to survivors, and $1+y$ the proportion of A to B among the survivors, so that x measures the intensity of competition, y that of selection.

Then when x is small y is roughly proportional to it. Thus when x increases from 10^{-4} to 10^{-1}, y increases 200 times. But when x is large y becomes proportional to $\sqrt{\log x}$. In consequence y only increases 9 times when x increases from 1 to 10^{12}, and is only doubled when x increases from 1 to 1800. In other words, when more than 50 per cent of the population is eliminated by natural selection, the additional number eliminated makes little difference to the intensity of selection. The theory, which I hope to publish shortly, has been extended to cover cases where the standard deviations differ, and also where populations consist of many genotypes. In general y changes its sign with x, but when x is large y never increases more rapidly than $\log x$.

Careful mathematical analysis seems to disclose the extraordinary subtlety of the natural selection principle, and merely verbal arguments concerning it are likely to conceal serious fallacies.

J. B. S. HALDANE.

John Innes Horticultural Institution,
Merton Park, London, S.W.19,
Nov. 1.

The Exit of *Leishmania infantum* from the Proboscis of *Phlebotomus perniciosus*.

SANDFLIES, *P. perniciosus*, infected with *Leishmania infantum* on a hamster, were allowed to feed on a solution of citrate by Hertig's method. This method consists of inserting the biting apparatus of living sandflies into a capillary in such a way that the mouth parts go through all the movements of piercing. In some species these movements in the Hertig apparatus are followed by activity of the pumping apparatus of the buccal cavity and pharynx which results in the ingestion of fluid. In the case of *P. perniciosus*, the mouth parts go through all the actions of piercing, but the insects seldom ingest fluid in the Hertig apparatus.

Fifteen sandflies from five to thirteen days after the infecting feed were placed in the Hertig apparatus. After an interval of one to three minutes, the sandflies were removed and the fluid in the capillary was examined. In six cases (9-10 days after the infecting feed) the fluid was found to contain flagellates. The number of flagellates found varied from one to hundreds, but in all cases the number recovered from the biting parts was very small as compared to the enormous numbers afterwards found in the dissected sandflies. In contrast to the flagellates from the mid-gut and œsophagus, which are very active, those recovered from the biting parts are sluggish and many of them quite motionless.

The above observations prove that *L. infantum* can leave the biting parts of *P. perniciosus* during the act of biting and enter a new host in the absence of any active interference on the part of the latter. We suggest that this accounts for the main peculiarity of Mediterranean kala-azar, that is, its relative frequency in infants less than twelve months of age.

S. ADLER.
O. THEODOR.

Kala-azar Commission of the Royal Society
and Hebrew University of Jerusalem.

Elements present in Animal Tissues.

IN a letter published in NATURE of Nov. 15, Mr. A. Chaston Chapman announces the interesting discovery of antimony in an animal. He refers also to the known presence of vanadium and arsenic in certain animal tissues. We purposely omitted from our letter to NATURE of Nov. 1 reference to a number of other elements which have previously been recorded as occurring in animal tissues but which have not up to the present been detected in our work, for reasons already given by one of us [1]. They are the following: Aluminium, zinc, boron, and silicon, from numerous animals; gold in mammals [2]; titanium in an ascidian [3]; bismuth [4] and tin [5] in human organs; vanadium, not only in ascidians, but also in a holothurian [6]. In addition, Dr. J. Needham has directed our attention to records of molybdenum [7] and uranium [8] in hens' eggs.   H. MUNRO FOX.
HUGH RAMAGE.

Nov. 25.

[1] H. Ramage, NATURE, **123,** 601; 1929.
[2] R. Berg, *Bioch. Zeit.*, **198,** 28; 1928.
[3] M. Azéme and H. Pied, *C.R. Ac. Sci.*, **190,** 1; 1930.
[4] T. Fairley and B. A. Burrell, *J. Soc. Chem. Ind.*, **37,** 155; 1918.
[5] E. Misk, *C.R. Ac. Sci.*, **176,** 138; 1923.
[6] A. H. Phillips, *Am. J. Sci.*, **46,** 473; 1918.
[7] W. R. Mankin, *Med. Jour. Aust.*, **2,** 87; 1928.
[8] W. B. S. Bishop, *ibid.*, **1,** 480; 1928.

English Equivalents of *Eigenfunktion* and *Eigenwert*.

MR. C. N. HINSHELWOOD suggests in NATURE of Oct. 18, p. 604, that the English equivalents of *eigenfunktion* and *eigenwert* should be *proper function* and *proper value*. Having shown how to develop the functions used by Schrödinger (see, for example, my paper in the *Phil. Mag.*, vol. 6, July 1928), may I again suggest from the nature of the Heaviside operator method disclosed that the terms to employ are *parametrals* and *parametral functions*.

A. PRESS.

New York, Nov. 3.