in 10^{15}. With an eight-bank computing machine we can readily find values for a and b that do not differ by more than one part in 10^7 and will usually differ by much less than this. Their arithmetical mean will therefore be the square root of N with an error of, at most, one part in 10^{15}. If still more digits are required, eight additional ones can be obtained in a few minutes by computing the term in $(a-b)^2$ above.

The same method can be used to extract square roots to three significant figures by mere inspection, and this degree of accuracy is sufficient in many computations, including solutions by least-squares. Thus, for example, the square root of 8·46 is seen to be not far from 3; dividing by 3 we get 2·82; the mean between this and 3 is 2·91, which differs from the square root of 8·46 by only 0·0014.

FRANK SCHLESINGER.

Yale University Observatory, July 12.

The Polishing of Surfaces.

THE manner in which an optical polish is produced on glass and metal surfaces has been considered by the late Lord Rayleigh ("Polish," Collected Papers, vol. 4, p. 542, "Interference Bands," vol. 4, p. 54). The amorphous layer theory of the late Sir George Beilby is well known. The article by Dr. J. W. French on "The Working of Optical Parts" ("Dictionary of Applied Physics," vol. 4) summarises and extends these considerations. Reference may also be made to a paper by M. M. Fichter, a notice of which appeared in NATURE, August 2, 1924, p. 173.

The object of this present note is to suggest that, in the process of polishing, surface layers are really melted by the communication of heat vibrations to them. Consider a single surface layer of glass molecules of area 1 sq. cm. If glass consisted wholly of silica there would be approximately 9×10^{14} molecules per unit area, each of mass 9×10^{-23} gram. Taking the specific heat of glass as 0·16, initial temperature 20° C., melting-point 1100° C., and assuming a latent heat of fusion 100 calories per gram, the heat required to melt a single layer of molecules of 1 sq. cm. area would be 900 ergs.

Now Beilby gives a pressure of 4 lb. per sq. inch (280 grams per sq. cm.) as sufficient to produce surface flow with rouge polishing. Taking a coefficient of 0·3, the work done against friction when this force is overcome through 1 cm. is 83,000 ergs.

As one stroke of a polisher will polish only a small proportion of the 1 sq. cm. area considered, there will be available in the ordinary polishing procedure frictional energy of amount many hundreds of times that required to melt one layer of glass molecules.

At first sight it might be thought that any great rise in the temperature of the surface molecules would be prevented by the loss of heat due to conduction, etc. But this is to suppose that conduction would take place across plane interfaces. Is it not more reasonable to consider the heat as being produced at *points* of contact? If these were mathematical points, then no matter how small the rate of production of heat at a point, the temperature at the point would be infinite (the expression for the steady temperature v at distance r from a point in an infinite solid where heat is being supplied at the rate of q calories per sec., is $v = q/4\pi rk$, where k is the thermal conductivity of the material).

That the temperature attained by a surface depends essentially on the manner in which the heat is applied, is illustrated by the fact that a bunsen flame (of high temperature) may be played on a block tin surface without melting it, while a small globule of molten lead (only 100° C. above the melting-point of tin), if dropped on to a tin surface, will melt the tin below.

As an analogy to the manner in which high temperature vibrations may be set up locally, in polishing a surface, reference may be made to the setting of a Kundt's tube into vibration by slowly stroking it by hand, or a violin string by the slow stroke of the bow.

JAMES M. MACAULAY.

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The Planetismal Hypothesis.

As there is a rising tide adverse to the planetismal hypothesis, may I record the following observation in its favour? Looking at the moon with a $9\frac{1}{2}$-inch reflector, I saw details of the structure of the great south wall of the crater Hommel; the circular fault is perfectly fresh, and the rock exposed is a giant conglomerate, the boulders several hundred yards in diameter, with cavernous spaces between. In moments of perfect pellucidity, my instrument is quite capable of defining objects half a mile in diameter. My observation confirms Pickering's at Arequipa, when he was looking at the fault-scarp of the Sinus Iridium, in the opposite quadrant.

On the earth, iron is being taken from the surface rocks by weathering; it is washed down in solution into the rivers, but does not reach the sea. It goes downwards, and where there is a precipitant, it replaces limestone, forming deposits of iron-ore; where there is nothing to stop it, it must proceed towards the centre of the earth. Reversing the process, it follows that this iron would have made the crust of the earth an ultra-basic material in the early history of our planet, or in other words, it would have been similar to what we now find on the moon, where there has been no water to obscure matters. The lower specific gravity of the moon would be accounted for by the boulders making an arch and girder formation, with spaces between.

E. H. L. SCHWARZ.

Rhodes University College,
Grahamstown, July 9.

Zoological Nomenclature: Suspension of *Sarcoptes*, type *passerinus*, in favour of *Sarcoptes*, type *scabiei*.

THE secretary of the International Commission on Zoological Nomenclature has the honour to invite attention of the zoological profession to the fact that application has been made to the Commission to suspend the rules in the case of *Sarcoptes* Latr., 1804, tsd. (Latr., 1810) *passerinus*, and to place *Sarcoptes*, 1804, in the Official List of Generic Names with *S. scabiei* as type.

The argument states that the application of the rules to this 'transfer' case will result in greater confusion than uniformity, involving generic, subfamily, and family names, and designations of diseases in human and comparative medicine. The suspension requested will result in validating internationally accepted (though erroneous) nomenclature in consistent use for more than a century in zoology, and in human and comparative medicine.

The secretary is familiar with the premises, and in his report to the Commission will state that he considers this a typical case in which suspension is justified. He will, however, delay announcement of final vote until about October 1, 1927, in order to give ample opportunity to interested persons to express their views for or against the suspension.

C. W. STILES,
Secretary to Commission.

Hygienic Laboratory, Washington, D.C.,
August 3.