

If only the largest constituents had been used the task of analysing for the remainder would have been made more onerous by the presence of this error, and much more so if there were unknown constituents to deal with.

I quite agree with Mr. Marmer that the only satisfactory method of testing the machines is to compare their results with the results of numerical or "hand" calculations, but such tests should be exhaustive and convincing.

A. T. DOODSON.

Tidal Institute, University of Liverpool,  
February 9.

#### The Brittleness of Ice at Low Temperatures.

SIR GEORGE BEILBY ("Aggregation and Flow of Solids," 1921) has recently directed attention to the impossibility of explaining the flow of glaciers at temperatures much below 0° C. on the regelation hypothesis, and the necessity for assuming a deformation of the ice-crystals by displacement along internal-glide planes or at the crystal boundaries. From his experiments on the behaviour of metals and minerals under pressure he suggests that in ice a vitreous modification will be produced at the plane of displacement, and that above a certain temperature—the "crystallisation temperature"—this will immediately revert to the crystalline state, the process being repeated indefinitely during movement. Should the temperature of the ice fall below this point it is predicted that the flow will be retarded, as the vitreous modifications of metals are harder than the crystalline, and their presence promotes rigidity.

It seems that here we have an explanation of the brittleness of ice at low temperatures. Navigators in the pack have noticed that the development of the pressure ridges is noiseless in summer, but accompanied by loud detonations in winter. Another consequence of the existence of this state at low temperatures is well known to every ski-runner in a distinct loss of gliding power. Sir George Beilby has shown that the "crystallisation temperature" for ice must lie somewhere below -12° C. There is general agreement in Norway that the "føre," though deteriorating slowly as the temperature falls below -5° C., receives a marked check at about -17° C., and Nansen's observations in the pack are fairly consistent with this figure. To test the validity of the explanation offered we must await the experimental determination of the "crystallisation temperature" of ice.

L. HAWKES.

Bedford College, Regent's Park, N.W.,  
February 4.

#### Age Incidence of Influenza.

Was not the unusual age incidence of deaths in the influenza epidemic of 1918-19, referred to in NATURE of February 2, p. 130, due to the special circumstances of that time? With few exceptions, all civilians in this country at that date between the ages of twenty and thirty-five could have been placed in one of three classes:—

(1) Persons engaged in war-work on the land, in factories, offices, etc. All these were doing a full man's working day (judged by the standard of normal times), and many were seriously overworking.

(2) Ex-Service men discharged on account of ill-health.

(3) Mothers of young children, who in many cases went short of food themselves in order to ensure an increased ration for their families.

None of these would have been so resistant to infection, or so well able to throw off disease when contracted, as they would have been in normal times.

ANNIE D. BETTS.

MISS BETTS suggests that the exceptional incidence of influenza mortality during the pandemic of 1918-19 may have been caused by the exceptional war-conditions, leading to the greatly increased occupation of women, to overwork of these and of men, and to the state of health of ex-Service men. To these suggested causes may be added the effect of the rationing of food, which might affect to an exceptional extent the mothers of young children.

These explanations of the strangely inverted age incidence of influenza mortality have been often debated. They cannot explain the course of events more than to a minor extent. For (1) with such an infectious disease as influenza domestic infection of older persons, even when they had escaped extra-domestic infection, must have been the general rule. War-conditions must surely have told heavily on aged persons.

(2) Curves given on p. 41 of the Registrar-General's Report on Influenza (Cmd. 700) show that this change in age incidence was unparalleled in the history of the disease, and that the changed age incidence characterised the beginning of each of the three consecutive waves of the disease. With the progress of each there was a diminishing youthfulness of decedents.

(3) This change in age incidence was not confined to this country or to other belligerent countries especially affected by war-conditions. It occurred, for instance, in Scandinavian countries and in America.

(4) The explanation that those attacked in the 1889-91 epidemic—the older section of the population—were relatively immune is not supported by any adequate body of evidence.

In short, the altered age incidence of influenza in the recent epidemic remains an unsolved problem. An easy way out of the difficulty, though a way probably not according with facts, would be to assert that the recent pandemic was a different disease from that of 1889-92.

THE WRITER OF THE ARTICLE.

#### Dr. Frank Bottomley.

MAY I be permitted to make a correction of an error in Sir Richard Paget's obituary notice of my cousin, Dr. Frank Bottomley, in NATURE of February 16, p. 212? Sir Richard states that Frank Bottomley's stepmother was "the widowed sister of Lord Kelvin." Frank Bottomley's father, being a son of Lord Kelvin's sister Anna, could not possibly have married another of the sisters. Lord Kelvin had three sisters, namely, Elizabeth, widow of the Rev. David King (she never remarried); Anna, Mrs. William Bottomley, who was Frank Bottomley's grandmother; and Margaret, who died in early childhood. As a matter of fact, Frank Bottomley's stepmother was a sister of Lord Kelvin's second wife.

JAMES THOMSON.

22 Wentworth Place, Newcastle-upon-Tyne,  
February 19.

#### Thermo-electric Instrument for Measuring Radiation from the Sky.

IN the note on Mr. W. H. Dines's memoir on "Observations of Radiation from the Sky" (NATURE, January 12, p. 54) you attribute to me the final design of the instrument. Permit me to say that Mr. Dines greatly elaborated and improved the thermo-electric instrument after I left it.

LEWIS F. RICHARDSON.

Westminster Training College,  
Horseferry Road, S.W.1.