method of studying the factors which influence the constitution and structure of animal fibres, and should reveal the cause of the remarkable variations in the sulphur content of fibres within a single lock. In addition, determinations of C for different types of wool may, for the first time, provide the craftsman with a measure of characteristics which he still identifies by combining a skilled tactile judgment with the results of long experience in the processing of wool.

We are indebted to the International Wool Secretariat for grants in aid of this investigation, and to Dr. G. Weiler and Dr. F. B. Strauss for the sulphur-content determinations.

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[1] Speakman, *Nature*, **159**, 338 (1947).

Behaviour of *Plasmodium berghei* in some Rodents

Plasmodium berghei Vincke and Lips 1948 is the first plasmodium found infective for rats and mice[1]. Vincke and Lips isolated this parasite from a wild tree-rat *Thamnonys* and found that it produced a fatal infection in mice and rats.

Apart from mice and rats, we have found *P. berghei* infective for the golden hamster *Mesocricetus auratus* and for the field vole *Microtus guntheri*. In the hamster *P. berghei* produces a fatal infection in almost all cases within a period of eight to twenty-nine days after inoculation. The infection is progressive, and the final parasitæmia may involve up to 50 per cent of the circulating red cells.

P. berghei is non-pathogenic for the local non-splenectomized field vole *Microtus guntheri*, in which it produces a transient patent infection involving 0·3–10 per cent and exceptionally up to 30 per cent of the red cells. The patent period lasts about a fortnight, and the infection then becomes latent except for the occasional finding of rare parasites in blood smears.

During the latent phase, parasites can be demonstrated either by inoculation of whole blood or macerated spleen or liver into susceptible animals, or by splenectomy which is generally followed by a high parasitæmia and death.

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[1] Vincke, I. H., and Lips, M., *Ann. Soc. Belge de Méd. Trop.* (1948).

Upper Limit of Frequency for Human Hearing

THE frequency above which air-borne sound becomes inaudible is generally considered to be about 20 kc./s. All sensitivity determinations agree that the threshold rises very steeply above 12 kc./s.; and above 12 kc./s. there are indications that frequency discrimination begins to fail, that is, that the least discriminable increment of frequency measured as a fraction of an octave begins to rise sharply. It seems to have been tacitly assumed that the human cochlea is incapable of response to frequencies above 20 kc./s., and that the upper limit for air-borne and bone-conducted sound is the same.

I have compared these limits on myself and two other subjects, using an oscillator of frequency variable up to 120 kc./s. and a transducer consisting of a pack of Rochelle salt plates resonant at 100 kc./s. In all cases the upper limit for air-borne sound, with the transducer held close to the external meatus of the subject, was below 16·5 kc./s. When, however, the crystal was pressed firmly on the mastoid or on the temporal region, a sound was heard for all frequencies up to at least 100 kc./s. In the former case the sound was perceived in the ipsilateral, in the latter in the contralateral ear. The failure at and above 100 kc./s. was at least partly instrumental, due to the failure of the oscillator to maintain an adequate voltage across the falling impedance of the crystal.

The sensation of pitch associated with the sound was approximately that of the highest tone audible by air conduction. As the frequency was varied continuously from 12 to 100 kc./s., the pitch rose with it to 15 kc./s. and stayed there as the frequency was further increased. No extraneous sensations, for example, of warmth, pain or discomfort, were induced and the sound heard was subjectively a perfectly normal tone.

It must be concluded: (1) that the sensory elements at the basal end of the cochlea are competent to respond to sounds up to 100 kc./s. in frequency; (2) that the failure of the normal ear to respond to air-borne sounds above 20 kc./s. is due wholly to the failure of the middle ear to transmit such frequencies.

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Anharmonicity of the Lattice Oscillations in the Alkali Halide Crystals

IN my note under the above title, published in *Nature* of July 15, there are two errors to which I wish to direct attention.

(1) The oscillation discussed there, namely, of the two interpenetrating lattices of Na^+ and Cl^- ions respectively, relatively to each other, is unique among the normal modes of oscillation of the crystal in that it polarizes the medium[1]. The effect of this is to reduce the coefficient of r^2 in equation (2) from a to $a - \frac{4\pi}{3} \cdot \frac{e^2}{8d^3}$. Equating this coefficient to $\pi^2 \mu \nu_0^2$, we get the frequency ν_0, the value of which remains the same as given in the note.

(2) The coefficient f appearing in equations (4) and (5) refers to a *pair* of ions, and will be double that defined by (3). This will make the magnitude of the anharmonicity and the rate of fall of C_v with temperature twice those given in the note.

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Aug. 18.

[1] See Kellermann, *Phil. Trans. Roy. Soc.*, A, **238**, 513 (1940).