conditions; and (c) staining methods require exacting techniques and are inconsistent. One promising aid to diagnosis is a modification of the antiglobulin test of Coombs, Mourant and Race[2] described by Dacie[3]. References to the use of the Coombs test in naturally occurring diseases of animals are rare although the test has been used in certain experimentally induced anaemias.

Anti-sheep globulin serum is prepared in rabbits by Slavin's method[4], inactivated by subjection to 56° C for 40 min and absorbed with washed red cells from the sheep whose serum was used to inject the rabbit. The test is routinely carried out in plastic haemagglutination trays at 37° C. At room or refrigerator temperatures in-saline agglutination may occur at certain stages of the parasitaemic cycle.

This method has shown that washed red cells from uninfected sheep and from sheep that are infected but not in an active phase of the disease show no agglutination at serum dilutions of 1 : 10. Cells from animals in which infection is or has recently been active, however, agglutinate in dilutions of up to 1:1,280—depending on the potency of the rabbit serum.

Limited observations, which require further investigation, suggest that the test generally remains negative during and after parasitaemic episodes after the first. In the early stages of *E. ovis* infection, therefore, the test should be valuable at least on a flock basis and preliminary observations suggest that this is so. Although the antiglobulin phenomenon in sheep may not be universally diagnostic of *E. ovis* infection, no other condition has been encountered in South Australia in which it occurs; in this state no blood parasites other than *E. ovis* are known to exist and the other known causes of anaemia are mineral deficiencies or excesses or helminths.

The use of sheep infected with *E. ovis* would also seem to offer opportunities for the investigation of the antiglobulin phenomenon itself.

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GENERAL

A New Pseudo-tensor with Vanishing Divergence

MUCH embarrassment has been caused in the general theory of relativity by the fact that the conservation equation for the energy tensor T^{ab} reads $T^{ab}_{\ |b}=0$ (covariant differentiation) and not $T^{ab}_{\ ,b}=0$ (ordinary differentiation). This led Einstein to construct a pseudo-tensor τ^{ab} satisfying $\tau^{ab}_{\ ,b}=0$ by adding to T^{ab} a suitably chosen pseudo-tensor formed from the metric tensor g_{ab} and its first derivatives. The purpose of this note is to offer a new way of reaching the desired equation $\tau^{ab}_{\ ,b}=0$.

As a consequence of the field equations $G^{ab} = -\varkappa T^{ab}$ and the identity $G^{ab}_{\ |b} = 0$, we have the conservation equation

$$T^{ab}_{\ |b} = T^{ab}_{\ ,b} + K_a = 0 \qquad (1)$$

where

$$K_a = \Gamma^a_{cb}\, T^{cb} + \Gamma^b_{cb}\, T^{ac} \qquad (2)$$

Note that K_a is not a tensor, and the use of a subscript rather than a superscript is of no significance. It is convenient to use imaginary time ($x^4=it$), so that for the d'Alembertian operator $\Box$ we have $\Box f=f_{,aa}$. The inverse d'Alembertian $\Box^{-1}$ is defined by the regarded potential

$$\Box^{-1}f(x) = -\frac{1}{4\pi}\int \frac{f(x')\, d_3x'}{|\mathbf{x}-\mathbf{x}'|},\ x'^4=x^4-i|\mathbf{x}-\mathbf{x}'| \qquad (3)$$

Define the pseudo-vector Q_a by

$$Q_a = \Box^{-1}K_a \qquad (4)$$

and the pseudo-tensor φ_{ab} by

$$\varphi_{ab} = Q_{a,b} + Q_{b,a} - \delta_{ab}\, Q_{c,c} \qquad (5)$$

the summation convention for a repeated suffix operating here and throughout. Then

$$\varphi_{ab,b} = \Box Q_a = K_a \qquad (6)$$

If we now define the pseudo-tensor τ^{ab} as

$$\tau^{ab} = T^{ab} + \varphi_{ab} \qquad (7)$$

we have the required result

$$\tau^{ab}_{\ ,b} = 0 \qquad (8)$$

by virtue of equations (1) and (6). By adding φ_{ab} to T^{ab}, we have constructed a pseudo-tensor with vanishing divergence.

I refrain from attaching the words momentum and energy to this pseudo-tensor or to integrals formed from it, because I believe that we are barking up the wrong tree if we attach such important physical terms to mathematical constructs which lack the essential invariance property fundamental in general relativity. All that should be asserted is that equation (8) is a logical deduction from the accepted equation (1) and the mathematical definitions involved. The result may be found useful in dealing with solutions of the field equations by methods of successive approximations.

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Megayear and Gigayear

PROFESSOR RANKAMA[1] has rightly drawn attention to the prevailing disorder in geochronological time-units and the abbreviations used for them, and his advocacy of "megayear" and "gigayear" is worthy of support. But the current international abbreviation for "year", as adopted by the SUN Commission of the IUPAP and the British Standards Institution, is not "yr" but "a" (refs. 2 and 3) and the appropriate abbreviations for megayear and gigayear are thus Ma and Ga. The admittedly incongruous appearance (for English-speaking readers) of the first may perhaps explain why it has not yet been generally adopted.

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