ascribed to the existence of a mechanical barrier to sperm migration presented by a non-patent cervix or by an encroachment of the foetal sac into the non-gravid left uterine horn. It is hoped to exclude the latter possibility by repeating this experiment at an earlier stage in pregnancy.

E. C. AMOROSO

Royal Veterinary College,
London, N.W.1.

J. L. HANCOCK
I. W. ROWLANDS

Wellcome Veterinary Research Station,
Frant, Sussex.
Nov. 21.

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Bile Acids of the Whale

As part of a general investigation into the nature of the 'bile salts' of vertebrates, we have examined the bile of a whale. So far as we know, no work on the 'bile salts' of cetaceans has previously been done. Through the kindness of Dr. M. Begg, of "Discovery" Investigations, we obtained bile from the fin whale (*Balenoptera physalus*): 3,000 ml. bile were collected from either the duodenum or the 'third stomach' of a single whale, and preserved with alcohol. The main biliary constituent has been found to be cholic acid, conjugated, apparently, chiefly with taurine. The chief 'bile salt' in this animal therefore resembles that of the teleostean fish, snakes and the majority of mammals so far investigated.

G. A. D. HASLEWOOD
VERYAN WOOTTON

Guy's Hospital Medical School,
London, S.E.1.
Dec. 22.

Production of Helium by Cosmic Rays

In a recent experiment, a packet of Ilford's nuclear research plates (type C2) was exposed to cosmic rays for a period of six weeks at the summit of Mont aux Sources (11,000 ft.), Basutoland.

A preliminary examination of these plates has revealed several features of interest; the present communication, however, is concerned with one only of these, namely, the large number of nuclear disintegrations which occurred in the glass bases of the plates. These disintegrations become evident, of course, only when the product particles cross the glass surface and enter the emulsion. They then give rise either to a single track or to a 'star', which differs from a star originating in the emulsion in that its rays do not actually meet. The accompanying photomicrograph illustrates this.

The following classification summarizes observations over 4 sq. cm. of one of the plates. No disintegration is included which originates at a greater depth in the glass than 20 microns.

	2 rays	3 rays	4 rays	5 rays	Total
Number of stars	44	55	18	5	122

This is equivalent to a minimum of 15,000 disintegrations per c.c. of the glass. The great majority of the tracks appear to be due to α -particles, but if the conservative estimate of one α -particle per dis-

DISINTEGRATION OF A NUCLEUS WITHIN THE GLASS BASE OF THE PHOTOGRAPHIC PLATE. COOKE $\times 95$ IMMERSION OBJECTIVE FOCUSED ON THE GLASS/EMULSION SURFACE

integration is allowed, the conclusion is that helium is produced in the glass at the rate of at least 10^6 atoms per c.c. per annum.

The chemical composition of the glass (by courtesy of Messrs. Ilford, Ltd.), excluding substances present in amounts of less than 1 per cent, is: SiO_2 , 72; Na_2O , 14; CaO , 9; MgO , 3 per cent. Now these five elements, constituting 98 per cent of the glass, are among the most abundant and most widespread in the lithosphere. Oxygen, the most plentiful, accounts for 47 per cent of the earth's crust; silicon is next in order, with 28 per cent; calcium and sodium, fifth and sixth, with 4 and 3 per cent; magnesium, 2 per cent.

Rayleigh found that helium is present in almost all minerals. Its ubiquity has usually been ascribed solely to the presence of radioactive minerals throughout the earth's crust. The experimental results referred to above appear to indicate, however, that cosmic radiation may be responsible, first, for some part of the helium occluded in rocks, and secondly, for its widespread occurrence.

Estimates of the age of rocks and of meteorites obtained from measurements of the volume of helium occluded in them are based on the assumption that the helium is derived from radioactive minerals. If, however, cosmic radiation is also responsible for the production of measurable quantities of helium, then these estimates would appear to be unreliable in cases where the amount of helium is small. An example may illustrate this. The age of the Bethany meteorite¹ has been calculated as 100 million years on the basis of an analysis showing a helium content² (of radioactive origin) of 4×10^{-5} c.c. per 100 gm. But a short calculation shows that the helium produced by cosmic rays in the soda glass used in the Mont aux Sources experiment would amount to at least 2×10^{-5} c.c. per 100 gm. in the same geological period.

The estimate of the age of rocks by the helium method has always been reckoned to yield a minimum figure since helium diffuses so readily. If, however, a part of the occluded helium has been produced by cosmic rays, this 'minimum' will, in certain cases, need to be reduced.

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H. E. HUNTLEY

Physics Department,
University of the Witwatersrand,
Johannesburg.
Nov. 18.

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