IN view of the foregoing interesting experiments of Dr. L. R. Maxwell, the following considerations will be of interest since they suggest that a modern view of the nature of cosmic radiation would render highly improbable any measurable effect of such a radiation in the matter of stimulating radioactivity.

According to the experiments of Millikan and Cameron, the absorption coefficient of the cosmic radiation is of the order of magnitude of 0·1 per metre of water, and, according to Dirac's formula (*Proc. Roy. Soc.*, **111**, 423; 1926), corresponds to such a frequency of radiation as would cause an individual cosmic ray to have an energy of about $1{\cdot}3 \times 10^{-4}$ ergs and be capable of producing about $0{\cdot}54 \times 10^{7}$ ions in air. If, following Millikan, we assume that the cosmic radiation produces on the average (through its direct and secondary (indirect) radiations) 1·4 ions per c.c. per second, we see that on the average there should only be about $1{\cdot}4/(0{\cdot}54 \times 10^{7})$, *i.e.* $2{\cdot}6 \times 10^{-7}$ primary cosmic rays absorbed per c.c. per second, or about $1{\cdot}3 \times 10^{-4}$ primary cosmic rays per gram of absorbing materials. The saturation current due to the polonium in Dr. Maxwell's experiment was about 0·3 e.s.u. and corresponds to about 10^{-11} grams of polonium. It is therefore clear that we should only expect a cosmic ray to be absorbed by one of these atoms once in about 10^{15} seconds, *i.e.* once in twenty million years. This consideration would appear to render very improbable a direct effect of the cosmic radiation in stimulating radioactivity even in the most favourable case where the volume of the preparation under examination was much larger than that used by Dr. Maxwell; for, while radioactive disintegration does take place with discontinuities, the process is sensibly continuous as compared with such an enormous period as that calculated above.

W. F. G. SWANN.

Bartol Research Foundation of
The Franklin Institute,
Philadelphia, Pa.

A Function of the Adrenal Cortex.

IF both adrenal bodies be extirpated in a cat, the animal dies in three or four days. If the same operation be carried out in a decerebrate cat (brain removed to the level of the corpora quadrigemina) death ensues in less than an hour—usually within half an hour. The fatal result is due to failure of respiration, and may be indefinitely postponed by artificial respiration.

Close behind each adrenal is constantly found a lymph node, united to the cortex of the adrenal by a plexus of lymphatic vessels. If this plexus be torn across, or if the lymph node itself be removed, the animal will succumb with the same symptoms and within the same time as if both adrenal bodies had been removed. Further, if the lymph be prevented from reaching the blood-stream by tying both innominate veins we get a similar series of events.

In several experiments, when the breathing has only stopped for a short time and the heart is still beating strongly, we have succeeded in temporarily restoring the respiratory function by means of fresh watery extracts of the adrenal cortex.

Destruction of the medulla of the glands produces no such results. Numerous controls of various kinds have been carried out. Extirpation of the semilunar ganglia and section of all nerves in the region are without effect, so long as the arterial supply to the gland is not seriously interfered with.

There seems to be no escape from the conclusion that some substance, which we propose to call *pneumin*, essential for respiration, is manufactured in the adrenal cortex and discharged into the circulation through the lymphatics. The conviction that cortex and not medulla of the gland is concerned is based upon the well-known fact that it is the cortex and not medulla which is essential for life, and that in the present series of experiments destruction of the medulla by cauterisation produces none of the results described above.

SWALE VINCENT.
J. H. THOMPSON.

Department of Physiology,
Middlesex Hospital Medical School, W.1.

Copper in Antiquity.

WITH regard to the British Association Research Committee's interim report on the sources of Early Sumerian copper (and bronze), referred to in NATURE of Dec. 8, p. 886, I should like to direct particular attention to the ancient workings for tin about Rooiberg and Blaubank in the Transvaal. The quantities of bronze now known to have been employed in early times would have involved very considerable ancient workings of copper nickel deposits if the nickel found in such bronzes had been mixed with the copper.

The few deposits of nickel and copper in Europe are not associated with ancient workings, whilst the chief ancient workings for copper in Europe and Asia are not associated with nickel.

In the Transvaal, on the other hand, nickel occurs in the same areas as the tin, and ancient smelting has been carried on there on an immense scale. An examination of the slag by H. S. Gordon has shown that the ancients smelted there for the direct production of bronze, *i.e.* they brought their copper ore to the tin- and nickel-bearing areas of the Waterberg.

Some investigators have estimated the production of bronze and tin in the Transvaal as totalling millions of tons. Such a production is utterly in excess of any possible local demand and indicates a distribution of the metals throughout the Old World.

It is the large scale of production in Southern Africa (in one single area there are said to be remains of forty-three furnaces) which points most to this area being the main source of the production of bronze in early days. No large ancient slag heaps from the smelting of tin *and* copper have been found elsewhere. A reprint of the papers already published locally on these workings, and a special request for more local information, would afford an interesting item for discussion at the forthcoming meeting of the British Association in South Africa next year.

BERNARD W. HOLMAN.

Royal School of Mines,
London, S.W.7.

A Neglected Aspect of Scientific Research.

THERE are thousands of workers and scores of secretaries of scientific societies in Great Britain alone who might admire and accept the value of the contentions in the excellent leader in NATURE of Dec. 15 on this subject, *but* what they want is the name and address of some person to whom they can refer the problem which is set to them by every technical paper, lecture, or note with which they are confronted.

"How do I index THIS?" is the question they ask—for they are quite unversed in the science of indexing. In a few months of practice, under the guidance (say by telephone) of a skilled indexer, the tyro will acquire the necessary knowledge and will not improbably thereafter continue to contribute to the world's store of available scientific records. The editors of scientific journals might, for example, mark each article with a bracketted numeral, being the correct Brussels Classification number of the subject discussed.

MERVYN O'GORMAN.