MESSRS. NEWTON AND WRIGHT deserve great credit for their pertinacity in endeavouring to convince the British medical world of the particular merits of the Snook transformer. There is little doubt that, apart from gratifying the conservatism of a considerable section of their customers, most British coil manufacturers will presently be found concentrating their efforts on some type of interrupterless transformer.

The induction coil is no longer the best equipment for the X-ray operator. It is essentially inefficient, and, in addition, is often badly served by the (mercury) break. It has been pointed out to me that I made no mention in my article of Prof. Taylor Jones's admirable work on the induction coil. This was far from my intention. My concern would rather be with the extent to which his published results have affected the designs of the British coil manufacturer. Dr. N. R. Campbell recounts further interesting work on the subject in recent issues of the *Philosophical Magazine*.

The future does not lie with the induction coil, but rather with the closed-circuit A.C. transformer and some variety of hot-cathode valve (somewhat the same as in wireless telegraphy). This arrangement requires neither interrupter nor commutator, and the resulting simplicity will undoubtedly appeal to the medical man. Unless British manufacturers "get busy" on some such lines, the American manufacturer will have it all his own way in the future, certainly for overseas trade.

An effective association of British manufacturers might result in this country taking the lead in X-ray matters instead of developing American inventions.

G. W. C. KAYE.

Wasps.

A MODERATELY sized underground nest of the common wasp (*Vespa vulgaris*) examined by me on July 27, 1915, in Selkirkshire, was 8 in. in diameter, and contained an adult population of 417 workers and the queen. In addition, the six cell-flats of the nest contained 1159 eggs, 1216 larvæ, and 1076 pupæ, all of the first brood; 288 eggs, 248 larvæ, and 144 pupæ of the second brood; and 42 eggs, 30 larvæ, and 14 pupæ of the third brood. The actual living total at the time of examination, including eggs, larvæ, pupæ, and adults, was therefore 4635. In addition, there had apparently hatched from the cells then occupied by second and third broods 852 individuals, of which only 417 were accounted for when the nest was exterminated; the surplus brings the total to more than 5000. This was a nest which, when it was destroyed, had completed only the least active half of the wasp season.

A full account of the distribution of the different stages within the nest, and the deductions drawn therefrom as to the rates of egg-laying, cell-building, hatching, and mortality, appeared in the *Scottish Naturalist* for November, 1915.

In the same paper will be found particulars of the inmates of two other nests of the same species: one examined by Mr. A. Macdonald in September, 1915, in Kincardineshire, contained 1197 adults, 652 larvæ, and 680 pupæ, while the remainder of 5321 cells either contained eggs or were empty; the other, examined in October, 1912, by Mr. W. Evans in Midlothian, was found to contain 11,560 cells, and was estimated to have produced no fewer than 25,000 wasps in the course of the season.

JAMES RITCHIE.

Edinburgh, May 12.

DURING the year 1909 I destroyed 113 wasp-nests, also 87 in 1911, carefully took out the combs unbroken, and counted all the wasps that I could find (all wasps previously able to fly). They were mostly *Vespa vulgaris*, *V. germanica*, and a very few *V. rufa* and *V. sylvestris*. During 1910 I could find only one nest of *V. rufa*. Subjoined are a few records.

Wasp Records.

1909				1 ♀ at least in all nests.		
July 21	...	6 combs,		547 ♀♀	No large cells in comb	
,, 23	...	9	,,	1475	,,	,, ,,
,, 24	...	3	,,	46	,,	44 ♀♀, 67 ♂♂. *V. rufa.*
,, 25	...	5	,,	396	,,	
,, 26	...	7	,,	1000	,,	
,, 26	...	4	,,	389	,,	106 ♂♂, 29 ♀♀.
,, 29	...	6	,,	472	,,	*Vespa sylvestris.*
,, 29	...	6	,,	600	,,	
,, 30	...	9	,,	2509	,,	
,, 31	...	9	,,	2344	,,	One large-celled comb.
Aug. 1	...	9	,,	2240	,,	No ,, ,,
,, 3	...	9	,,	2560	,,	
,, 5	...	9	,,	2413	,,	Two ,, ,, *V. germanica.*
,, 6	...	8	,,	2557	,,	One ,, ,,
,, 8	...	10	,,	3919	,,	,, ,, ,,
,, 13	...	3	,,	287	,,	156 ♀♀. *V. sylvestris.*
,, 15	...	10	,,	4287	,,	One big-celled comb. *V. germanica.*
1911						
Aug. 9	...	11	,,	3420	,,	Three ,, ,, ,,

These are a few records from about 300 acres of land here. I should conclude that 5000 ♀♀ wasps able to fly constitute a strong working nest of *V. vulgaris* or *V. germanica*, and perhaps *V. norvegica*.

RICHARD F. BURTON.

Longner Hall, Salop, May 9.

THE NATIONAL RESEARCH COUNCIL OF THE UNITED STATES.

AS the result of an executive order issued by President Wilson on May 11, 1918, the temporary arrangement inaugurated two years previously has acquired permanence as the National Research Council of the United States. The history of this organisation is instructive in showing that in time of national stress the Governmental authorities appreciate the necessity for active co-operation from scientific bodies or individuals who have in peace conditions received but little recognition or support.

During the War of the Rebellion, Abraham Lincoln caused the incorporation of the National Academy of Sciences, corresponding to the Royal Society, in order to have available, for national purposes, a body of men who were representative in their branches of science. Their duty was to investigate any problem of national importance when called upon to do so by a Government Department. The expenses of the work were to be defrayed by the State, but the academy received no compensation whatsoever. In the fifty-three years of peace which followed, the National Academy pursued its course as an ordinary scientific organisation of the highest class, giving advice to the Government from time to time when called upon to do so.

After the attack on the *Sussex* in April, 1916, the National Academy offered its services to the President for organising the research facilities of the country in order to prepare for any eventual active part of the United States in the war. This offer was accepted by the President, and the National Research Council was constituted. In July of that year the success which followed the organisation of research work by the National Academy of Sciences had already been sufficient to call forth the thanks of President Wilson.

During the succeeding eighteen months the National Research Council was thoroughly organised, and throughout this period rendered the greatest service to the nation in directing and conducting investigations connected with the prosecution of the war and with national welfare. Its activities were not confined to research alone, but a very important division occupied itself with general relations. Information was collected from foreign sources and distributed to those workers who had need of it. Large questions of reconstruction, education, and foreign relations were handled from the scientific and industrial aspects.

The technical divisions of the Council were as follows: Military; engineering; physics, mathematics, astronomy, and geophysics; chemistry and chemical technology; geology and geography; medicine and related sciences; agriculture, botany, forestry, zoology, and fisheries. Under these heads a large number of members were co-opted to deal with special subjects.

As will be seen, this very complete system enabled the National Research Council to bring under its direction practically everyone available whose capacity for research work was a national asset.

So successfully did the Council carry out the programme assigned to it that on May 11 of last year the President requested the National Academy to perpetuate the National Research Council in order that it might be available not only for war-time problems, but also for the large issues of peace.

The six paragraphs in which the President sums up the duties of the National Research Council are the clearest exposition possible of the relations of research and research workers to national efficiency, but they also point out what are the obligations of the nation towards stimulating investigation in the United States. Stress is laid on co-operative work, but it is pointed out that co-operation must be of such a type as to ensure individual initiative.

It is especially noteworthy in the President's order that collaboration of the scientific and technical branches of the Government, both military and civil, with the National Research Council is required. The nominations, however, to the Council from the Government bureaux are made by the president of the National Academy of Sciences. They are then designated by the President of the United States to take their place on the National Research Council. In this way the Government representatives are men whose scientific qualifications are vouched for by the president of the National Academy of Sciences.

Thus it is that the national direction of research work in the United States has become vested in a body of men whose conduct of research work during the war period of that country has shown that they are competent to handle the great problems which go with peace and reconstruction. The scheme is a wise one, because it calls for the closest co-operation between the Government and the research worker, but leaves the decision as to the methods of attack in the problems involved in the hands of experts.

The financing of investigations under the National Research Council was carried on with funds which aggregated 54,096*l.* for the fiscal year 1919. These were derived from the Rockefeller Foundation, the Carnegie Institution, and the President's Fund.

Two important developments have taken place since the foundation of the Council. The first is the result of the Rockefeller Foundation entrusting to the Council the sum of 100,000*l.* for expenditure within a period of five years for research in physics and chemistry in educational institutions in the United States. The primary feature of the project is the initiation of research fellowships. This will open a scientific career to a larger number of able investigators, and will meet an urgent need of the universities and industries. It is expected that fifteen to twenty fellowships will be available during the coming year.

The second development brings the Council into the closest touch with the scientific and technical societies of the United States. By a recent decision of the Council the majority of the members of a division must be representatives elected by the leading scientific societies. In the division of chemistry and chemical technology, for example, nine members are elected by the Chemical Society, one each by the Electrochemical and Ceramic Societies, and one by the Institute of Chemical Engineers. Only six members are chosen by the Council itself.

There can be no doubt that this programme, in which the direction of national research work is placed in the hands of capable men of science, in which ample opportunity is afforded younger men of originality to develop their genius, and in which the head of the State and his advisers have actively attested the vital necessity of original investigation in any scheme of national efficiency, initiates an era of scientific productiveness for the United States far greater even than the important output to which we were accustomed before the war. C. G. L. WOLF.

WATER-POWER DEVELOPMENTS.

THE prominence which has recently been given to the latent possibilities of power in streams, at present, from an industrial point of view, running to waste, has had the effect of stimulating public and professional interest to such a degree that reports and articles on the subject are now being published in close sequence, and we are appreciably increasing our knowledge of the conditions prevailing in appropriate regions, and of the measures which are desirable for exploiting such sources of power. The Royal Swedish Waterfalls Board is losing no time in developing the mountainous supplies of Lapland. The Canadian water-power departments are equally active as regards the hydrometric survey of Canada. Our own Government has taken the