edies, often originally manufactured from a doctor's family prescription, and undoubtedly beneficial for uncomplicated ailments. The chief criticism made upon the sale of medicines belonging to this group is that their retail price is out of all proportion to their cost, and that they are often recommended for cases they cannot benefit, thus causing the purchaser to run risk of serious injury by delay in seeking proper medical treatment. (2) Dangerous remedies which should not be sold at all, or only on a doctor's prescription; or which should not be sold for the purpose for which they are offered. (3) Fraudulent remedies: these are a large group, consisting of abortifacients, alleged cures for cancer, consumption, diabetes, paralysis, epilepsy, deafness, and so on, together with electric belts, apparatus for supplying oxygen to the system (otherwise than by respiration), "ionised" water, and the like. With a touch of humour, the Committee remarks that "the discovery of radium will probably add a number of remedies to this group." It has, in fact, already added some. The treatment of "remedies" included in this category need involve no doubt or hesitation. "They are, and are known by their makers to be, cruel frauds." The sale and advertisement of them should be prohibited under drastic penalties. Finally, (4) there is a large group of remedies making grossly exaggerated claims. In respect of these, it is regarded as beyond doubt that the public is defrauded on a large scale by promises which cannot be fulfilled.

A good deal was said during the inquiry about the difficulty, and even the impossibility, of completely analysing certain medicines—a matter which is vital to many proposals for dealing with secret remedies by law. It was pointed out that even such familiar and apparently simple articles as extracts of dandelion and gentian are really highly complex bodies, the exact composition of which is still unknown to chemistry, and when several such extracts are present in a mixture detection of all becomes difficult, and accurate determination of any may be out of the question. But whilst this is true enough, the focussing of the discussion upon this point puts the matter out of perspective. There are limits to the powers of analysis, but in a large majority of cases the essential nature of the principal constituents of any medicine can be detected with almost perfect certainty and determined with reasonable accuracy, given skill, time, and a sufficient quantity of material.

Several abuses in connection with secret remedies are indicated. Thus the composition has sometimes been changed whilst the name remained unaltered; *e.g.*, acetanilide has been replaced by phenacetin, and the potent drug morphine has been added in one case, removed in another, without the change being brought to the purchaser's notice. Again, one medicine is recommended as "a safe and simple remedy" for both asthma and bronchial affections, though these are medically of quite different types, the former being

a nervous disease; the latter an inflammation of the mucous membrane.

The Committee gives cogent reasons against adopting a suggestion made by medical witnesses and others, namely that every remedy sold should be compelled to bear a label stating its exact composition. This would inflict hardship; it would not necessarily convey useful information to the purchaser, who could not be expected to know chemical names such as, for example, "hexamethylene-tetramine"; moreover, an accurate statement might be in itself misleading. It is proposed, however, that an exact and complete statement of the ingredients and their proportions should be lodged with a department of the Government, and controlled by a confidential analysis. All patent, secret, and proprietary remedies should be registered with this department, and a special Court or Commission should have power to prohibit the sale or advertisement of such remedies, either in the public interest or on the ground of non-compliance with the law. New legislation is urgently needed to deal with a state of things which has become intolerable.

The findings and recommendations of the Committee are too lengthy to summarise further here. It may be said generally that the Report is fair but firm, and shows that its compilers, whilst considering legitimate interests, have not allowed themselves to be hoodwinked by the quack.

ORGANISATION OF SCIENCE.

JUST before the beginning of the war much fruitful discussion was going on in the columns of *NATURE*, the *Morning Post*, and *Science Progress* on the subject of the encouragement of science; and those who are interested in the theme should read Dr. R. S. Woodward's address on the needs of research, delivered on the occasion of the dedication of the Marine Biological Laboratory, Woods Hole, Massachusetts (*Science*, August 14, 1914).

Dr. Woodward begins by exposing some of the popular fallacies regarding research—that it "is akin to necromancy"; and that "the more remarkable results of research are produced not by the better balanced minds, but by aberrant types of mind popularly designated by that word of ghostly, if not ghastly, implications, namely, 'genius.'" He has also exposed the absurdity that research institutions should busy themselves in soliciting suggestions from the amateur public outside, that is, "in casting drag-nets in the wide world of thought, or in dredging, as biologists would say, with the expectation that out of the vast slimy miscellanies thus collected there will be found by the aid of a corps of patient examiners some precious sediments of truth." He thinks that "important advances in knowledge are far more likely to issue from the expert than from the inexpert in research."

Dr. Woodward traverses the idea "that research is a harmless and a fruitless diversion in the business of education"; and gives some figures

as to the comparative expenditure of the United States on education and research respectively.

The number of higher, or degree-giving, establishments in the United States is now upwards of six hundred; the aggregate annual income of these is upwards of one hundred millions of dollars; and the number of officials connected with them is upwards of thirty thousand. On the other hand, the number of independent research organisations in the United States is less than half a dozen; their aggregate annual income is less than two million dollars; and the number of officials primarily connected with them is less than five hundred.

Something very like this holds also in Britain, and indeed throughout the world. Men cannot be made to understand, even with the astonishing results which investigation has placed before us, the supreme importance of such effort. They still conceive that it is more important to teach boys how to do things than actually to get the things done.

The war now raging will at least demonstrate one thing to humanity—that in war, at least, the scientific attitude, the careful investigation of details, the preliminary preparation, and the well thought-out procedure bring success, where the absence of these leads only to disaster. So also in everything. After all, the necessity for research is the most evident of all propositions. But the question (which I hope will receive still more careful attention when the war is over) is, What can the State do to make the machinery of investigation the most efficient possible? The mere citing of popular misconceptions is not enough; we need to have specific programmes. The October number of *Science Progress* contains one such programme, which I hope will receive the attention of men of science. Whether all the items are accepted or not remains to be seen; but until the discussion is earnestly undertaken, we can scarcely hope that the State will give more help than it has done hitherto. Dr. Woodward puts his finger upon a weak point in men of science as a body. "We are," he says, "as a class of too recent monastic descent to fit comfortably in our present social environment." That is just it. We are not strong enough in making our demands heard; and, in my opinion, this is not a virtue, but a neglect of duty.

RONALD ROSS.

ANNIVERSARY MEETING OF THE ROYAL SOCIETY.

THE anniversary meeting of the Royal Society was held on Monday, November 30, when an address was delivered by the president, Sir William Crookes, and the report of the council was presented. After referring to the financial strain under which the society and the National Physical Laboratory have been placed by the war, the president passed to the consideration of the constitution of the atom and the work of the metallists. Subjoined are the portions of the address referring to these matters:—

The subject of the constitution of the atom has come into extreme prominence—great advances have been made—while much light has been thrown on the ultimate structure of matter. Years ago, during the persistent and systematic fractionation of yttrium, I explained that I had succeeded in separating the atoms of the so-called element into groups; these groups undoubtedly exhibited different phosphorescent spectra and presumably had different atomic weights—although from the chemical point of view all the groups behaved similarly. I concluded that, of the lines and bands of the compound spectrum of an element, some are furnished by certain atoms and some by others. I pointed out that this was not likely to be an isolated case; that probably in all so-called elements the whole spectrum does not come from all the atoms—that different spectral rays come from different atoms, which may be interpreted to mean that there are definite differences in the internal motions of the several groups of which the atoms of a chemical element consist. I ventured to suggest a possible explanation of these facts, based on the assumption that acting on the original *protyle* were two forces—one of the character of Time, accompanied by a lowering of temperature, while the other, swinging to and fro like a pendulum, and having periodic cycles of ebb and flow, rest and activity, would be intimately connected with the force of electricity. I arrived at a presentation of the elements on a lemniscate path which seemed to me to throw some light on the question of their genesis. My researches seemed to show that the persistence of the ultimate character, the eternal self-existence, the fortuitous origin of the chemical elements, could no longer be regarded merely as probable.

Apparently bodies exist which possess close upon the same atomic weights and combine in definite proportions with other substances and yet exhibit certain minute differences. For these substances, which are capable of being isolated and identified, I suggested the name "meta-elements." Thus there appears to me to be a gradation of molecules of different ranks between the atom and the compound—and these aggregations of atoms in certain circumstances might well pass for simple elementary bodies.

In recent years the old idea of the ultimate atom as a solid particle, spherical or otherwise, has slowly, almost imperceptibly, given way to the more rational conception of a minute planetary or "Saturnian" system of dazzling complexity; the conception is many-minded, aided here and there by facts that failed to fall in with the old lines of thought. Among the most prominent men through which the new conception has come to light, we have Kelvin, Stoney, Thomson, and, more recently, headed by Sir Ernest Rutherford, a host of vigorous workers in the new science of radio-activity, who have built up a conception of atomic physics often "hard to be understood," but that probably is a move in the right direction. Sir Ernest Rutherford supposes the atom to be composed of a nuclear positive charge, exceedingly small compared with the sphere of action of the atom, and consisting of a number of unit charges. Surrounding this nucleus is an external shell in which a number of separate negative electrons are distributed. Prof. Soddy—whose name is closely associated with that of Sir Ernest Rutherford—is one of the earliest workers in radio-activity, and has developed a theory of the chemistry of the radio-elements based upon the periodic law and a modified form of lemniscate spiral where the existence of *pseudo-elements* having slightly different atomic weight but identical chemical properties are set out. These "isotopic" elements occupy the same place in the periodic table. He has