Letters to the Editor.

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On the New Element Hafnium.

In a former letter to NATURE (January 20, p. 79) we announced the discovery of a new element with atomic number 72, for which the name hafnium was proposed. Evidence was given that this element is a homologue of zirconium in accordance with theoretical expectations (Bohr, "Theory of Spectra and Atomic Constitution," p. 114, Camb. Univ. Press, 1922). Continued experiments enable us to complete the statements in the former letter. By the addition of a known quantity of tantalum (73) to our samples, and by a comparison of the intensity of the Ta-lines with the Hf-lines, a closer estimate of the amount of hafnium present has been obtained. We have investigated a great number of zirconium minerals from different parts of the world. They all contained between 5-10 per cent. of hafnium. In samples of commercial zirconium oxide investigated, we have found the new element, amounting in one case to as much as 5 per cent. Starting from the latter substance, by means of a chemical method which is also adapted to separate zirconium from the other tetravalent elements, we have been able to obtain several grams of a preparation in which the presence of about 50 per cent. of hafnium could be established. Conversely, we have succeeded in preparing zirconium in which no hafnium lines could be observed. Further particulars about the method of preparation and provisional determination of the atomic weight will be published shortly in the communications of the Copenhagen Academy.

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Copenhagen, January 31.

The Latent Period in Lubrication.

SOMETIMES in a scientific inquiry results accrue which are called, in laboratory slang, "pretty"; the pieces of the puzzle have fallen together in a fashion so pat as to give artistic pleasure.

Most lubricated surfaces have the curious property that the friction falls after the lubricant has been applied, until a steady state is reached after an interval which may vary from a few minutes to a few hours. For example, a clean surface of glass lubricated with pure heptioic acid, the slider being in position, the initial value of the coefficient of friction at 12° was $\mu = 0.51$, but in 40 minutes it had fallen to its steady value, $\mu = 0.40$.

This latent period, as it may be called, is shortened by a rise in temperature and, apparently, by mechanical agitation; and is manifested by surfaces lubricated only by a film of insensible thickness as well as by those flooded with liquid.

The most striking fact, however, is the influence of the slider. The final steady state is never reached unless the slider is in position. Surfaces which have been freely exposed to vapour or to an excess of fluid resting on them always have high friction when first put in contact. The lowest value is given only by a film of lubricant which has been enclosed for some

time between two solid faces. Such is the puzzle, and the explanation is curiously simple.

A molecule of an aliphatic acid or alcohol is like a rod loaded at one end. Putting a drop of one of these substances on a clean surface is like flinging a handful of such rods, picked up at random, at it; some hit and stick by the loaded ends, others by the unloaded ends. Condensation from the vapour is similar except that the rods are flung singly.

It is practically certain that friction is lowest when all the rods are orientated in the same way, a condition which will be reached only when the wrongly orientated molecules have had time to evaporate off into the fluid or vapour and have been replaced by molecules rightly orientated. The latent period is the time occupied by this readjustment.

So long, however, as the layer is exposed to fluid or vapour it is always losing or gaining molecules by evaporation and condensation, and some of those arriving will be wrongly orientated. The layer will reach a steady state, but it will not be that of least friction because at any moment a fraction of the molecules will be wrongly orientated. Orientation will be as perfect as possible and friction at its lowest only after a layer has been for some time shielded from evaporation by being enclosed between solid faces.

If this explanation be correct there should be no latent period when both ends of the rods are alike. This is so. In normal paraffins both ends are alike, and in no circumstances do surfaces lubricated by normal paraffins show a latent period.

The fact that a latent period exists is of importance to practical lubrication. The molecular process which causes it is, we believe, of importance in the mechanics of living matter. Physiologists will note how it recalls du Bois Reymond's theory of muscle and nerve.

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January 23.

The Rule of Priority in Nomenclature.

IN NATURE for February 3, p. 148, Mr. F. Chapman mentions three distinct proceedings that may affect the stability of nomenclature in zoology. Concerning those that arise from differences of opinion as to the classificatory value of certain shapes or structures, or those that depend on the advance of knowledge, on corrections of fact, or on the need for breaking up unwieldy groups, it is useless to argue. No system of classification and nomenclature devised by man can cope with such inevitable changes.

The third proceeding, with which alone I venture to deal here, is the discovery that a name in general use was predated by a name that hitherto has been left in obscurity, and the consequent enforcement of the law of priority. On this point Mr. Chapman's letter overflows with good sense; but it has all been said before. His laments, however, will not have been entirely wasted if you will permit this consolatory reply—namely, that in the year 1913, at the International Congress of Zoologists in Monaco, an agreement was reached in the largely attended section on nomenclature and confirmed in plenary session, by which the International Commission on Zoological Nomenclature was given power, on certain conditions, to suspend the rules in those cases where their operation was contrary to the general convenience. The Commission has, on the request of various