Dynamics," § 46). For several electrons there is no similar simple transformation. The "radiating" electron compels the remaining electrons to execute motions of reaction, which also influence the nucleus.

Probably it will be possible to derive a sufficiently approximate formula for the case of the *p*- and *d*-motions of lithium. This must be very difficult, however, for the case of the 1·5 S-path. The fact that at all events equation (1) cannot be true in general for atoms with several electrons will be shown by the following example (though of course on account of the Principle of Correspondence not representing a process really occurring in nature): two electrons move around the nucleus in a centrally symmetrical configuration, at first in a two-quantum and then in a one-quantum circle. By symmetry the nucleus remains continually at rest. In this case therefore the liberated energy and, consequently, the radiated ν would, contrary to (1), be exactly independent of the mass of the nucleus. P. EHRENFEST.

The University,
Leyden, Holland.

I SHOULD like to add a few remarks to the interesting letter of Prof. Ehrenfest about the contents of which he was so kind to inform me before publication. As pointed out in his letter, the effect of the mass of the nucleus on the spectrum of an atom, containing more than one electron, is a complex problem which depends on the electronic arrangement in the states of the atom, involved in the emission of the lines, in a way which has hitherto not received sufficient attention. Not only may the mass effect disappear completely in such cases, where several electrons move round the nucleus in equivalent orbits, but, as indicated by Prof. Ehrenfest, this effect may also in case of the motions which we actually meet in the emission of the series spectra be different from that calculated for an atom with one electron.

Although in the emission of these spectra we are concerned with motions whereby a single electron moves in an orbit different in type from the orbits of the other electrons, the problem differs essentially from the problem of two bodies in celestial mechanics. Thus according to the picture of atomic constitution, outlined by the writer in two letters to NATURE (March 24, 1921, October 13, 1921), we shall assume that the electron connected with the emission of the series spectra, although during the larger part of the revolution it remains outside the configuration of the electrons in inner groups, it will nevertheless in certain states penetrate into the interior of the atom during its revolution. The fact that the electron in the inner loop of its orbit is subject to large forces is of preponderant influence as regards the fixation of the energy in the corresponding stationary states of the atom. For such a motion the effect of the nuclear mass might differ essentially from that estimated from an examination of the mechanical properties of the motion in the outer loop only, and the question arises, whether the mass effect is sufficiently large to account for the discrepancies, observed by Merton, in the wave-lengths of certain lines in the spectra of lead isotopes, which although very small are yet much larger than those to be expected from the simple formula quoted in Prof. Ehrenfest's letter.

Although this question seems difficult to settle without a closer investigation, it would scarcely appear probable that the answer will be affirmative. On the other hand, it cannot be excluded that the discrepancies in question are due to a slight difference in the field of force surrounding the nucleus, arising from the difference in the internal nuclear structure of the lead isotopes. This possibility has been discussed from various sides. At first sight we meet with the difficulty, that the dimensions of the nucleus (*ca.* 3×10^{-12} cm.), estimated from experiments on the scattering of α-particles, are exceedingly small in comparison with the dimensions of the orbits of the electron responsible for the emission of the series spectra, which are of the order 10^{-8} cm. or larger.

This difficulty may disappear, however, by considering the circumstance mentioned above, that in certain states the series electron during a short interval of its revolution penetrates deeply into the interior of the atom. In fact, we must assume, that this electron in the states corresponding to the S-terms of the series spectra penetrates to even smaller distances from the nucleus than the electrons in the innermost group of the atom, the dimensions of which are in lead smaller than 10^{-10} cm. To the possible importance of this point in connection with the spectra of isotopes my attention was kindly directed by Dr. Kramers in a discussion about Prof. Ehrenfest's letter. N. BOHR.

University, Copenhagen.

The Destruction of Mosquito Larvæ in Salt or Brackish Water.

A NUMBER of experiments on the destruction of mosquito larvæ by the well-known system of "surface oiling," carried out at Hayling Island during the year 1921, supplied further evidence of the fact that this method is not one of universal application. The production of an unbroken film of a sufficiently lasting nature is sometimes an impossible task, notably in cases where the water surface is broken up by growths of reeds, etc., or is too freely exposed to the wind. In cases of this kind it is necessary to discard the oil film in favour of a "larvicide," that is to say, a substance which, by mixing with the infested water, will destroy the larvæ.

Unfortunately, however, practical information concerning larvicides is difficult to obtain. In the literature of the subject references are to be found to a number of suggested substances, but the vast majority of these stand self-condemned owing to the prohibitive cost that would be entailed by employing them in the prescribed "strengths" on any practical scale. A large number of these larvicides are, moreover, admittedly ineffective when added to brackish or salt water, and are consequently of little value in districts such as Hayling, where the salt-water mosquito, *Ochlerotatus detritus*, is the principal offender.

A number of tests have recently been carried out in the laboratory of the Hayling Mosquito Control, in the hope of discovering a larvicide which could be used successfully (and at a low cost) in salt, or partly salt, water. It was found that a liquid containing 15 per cent of soluble cresol, sold as a disinfectant under various names, gave very promising results in the laboratory. This liquid, at a dilution of 1 in 16,000, was found to kill the larvæ of *Ochlerotatus detritus* in one hour; at a dilution of 1 in 32,000, in one and a half hours; and at a dilution of 1 in 48,000, in three and a half hours. In the majority of these experiments the water containing the larvæ was of a salinity about half that of sea water.

In order to test this larvicide on a larger scale, a shallow stretch of brackish water adjoining the Hayling Golf Links was selected for experiment. This water was very heavily infested with the larvæ