$$\omega_K = \frac{\delta E}{\delta J_K}; \quad J_K \omega = \overline{2T}; \quad J_K = 0$$

all the quantities being calculated according to the new electromagnetic equations.

Unfortunately, this formulation gives us no definite solution of the three-body problem in terms of known constants, for the values of $\mathfrak{H}$ and $\mathfrak{D}$ are unknown though one-half the sum of their squares is known to equal $h\nu$. In general, the solution must be different from that, assuming the ordinary law of force, because the magnitude of the periodic forces acting on an electron due to the changing relative position of the other electrons, would be different according to the present theory to that calculated from Coulomb's law. If, however, $\mathfrak{D} = 0$, this difference of the motion, due now exclusively to the change in the expression for the magnetic force, would be small since magnetic forces due to electron motion in general contribute but little to the total motion, the calculation reducing in this case, except for a small correction (of the order of the relativity effect), to the type of model investigated by Kramers. In the probably impossible case $\mathfrak{D} = h\nu$ there would be no perturbing perodic electric force on the motion of one electron due to the motion of another of the same frequency, even though the rotation was of different sense. This might lead, for example, to the model of a helium atom with the two electrons rotating in opposite senses, in equal circular orbits in parallel planes. Probably the true expression for $\mathfrak{D}$ and $\mathfrak{H}$ is not as simple as either of these cases, but it might still be reasonably expected that pairs of orbits might be found in which the perturbing effect of one on the other would not be large, even though the rotation was of opposite sense, a requirement which seems necessary to account for the low magnetic moment of certain atoms containing even numbers of electrons.

MINERALOGY.—*Boulangerite from the Cleveland mine, Stevens County, Washington.*[1] EARL V. SHANNON, U. S. National Museum.

Within recent years the mineral boulangerite, heretofore considered rare, has been found by the writer to be perhaps the commonest of the lead-antimony sulphosalts. Its occurrence in two important districts in Idaho, one in Montana, and one in Bolivia have been described[2] and it has since been found in ores from additional mines

[1] Published by permission of the Secretary of the Smithsonian Institution.

[2] E. V. SHANNON, Proc. U. S. Nat. Mus., **58**: 589–607. 1920.

in these regions and from Lower California. Another locality which came to notice a year or so ago is the Cleveland mine in Stevens County, Washington, where this mineral is one of the major constituents of a lead-silver ore occurring in lens-shaped bodies in fractured and brecciated zones in dolomitic limestone.[3] The Cleveland mine is located 18 miles by road west of Springdale, a town on the Great Northern Railway. In some bodies of ore the boulangerite is the most abundant mineral and it is prominent in most of the ore. The associated primary sulphides are galena, sphalerite, and arsenopyrite. Secondary minerals formed by the oxidation of these include cerusite, anglesite, mimetite, bindheimite, valentinite, and scorodite.

The specimens from this locality were received from Mr. Henry Fair of Spokane, Washington, to whom the writer desires to extend his thanks.

The boulangerite forms excellent specimens which apparently are available in quantity. The best one received weighs in excess of 2 pounds (1 kilogram) and is 90 per cent boulangerite. The mineral does not form free crystals but makes up columnar masses in which the parallel blades reach 10 centimeters in length. The color is light bluish lead-gray and the luster is metallic. The mineral becomes dull on exposure. Although there is evidently a tendency to cleavage, the larger blades are made up of fibers and no clean cut cleavage fragments can be obtained for measurement. The cleavages are in the vertical zone and there is none transverse to the fibers.

The material analyzed (U. S. Nat. Museum Catalog No. 94,514) was submitted to a metallographic examination, in polished section, by Mr. M. N. Short of the U. S. Geological Survey, who reports it pure except for the presence of about one tenth of one per cent. of pyrite. The microchemical reactions obtained with the standard reagents of Davy and Farnham are as follows: Strongly anisotropic; HNO_3 instantly tarnishes iridescent; with a slight effervescence; HCl fumes tarnish slightly—not always; KCN negative; $FeCl_3$ negative; KOH negative; $HgCl_2$ negative. These tests agree with those given for boulangerite by Davy and Farnham except that, where they describe the mineral as sectile, it is very brittle. The reaction—negative—with KOH immediately distinguishes this mineral from a jamesonite recently examined which quickly tarnishes dark brown with this reagent.

[3] O. P. Jenkins, Lead deposits of Pend Orielle and Stevens counties, Washington. Wash. Dept. of Conservation and Development, Div. of Geology Bull. **31**: 127–130. 1924.

The sample analyzed gave the results of column 1 of Table 1, while in column 2 is given the calculated composition agreeing with the formula of boulangerite, $5PbS. 2 Sb_2S_3$, and in column 3 the theoretical composition of jamesonite according to Schaller's formula, $4PbS. FeS. 3Sb_2S_3$.

TABLE 1.—ANALYSIS OF BOULANGERITE

	I	II	III
Insoluble	0.40		
Lead	55.34	55.41	40.32
Iron	0.52		2.72
Antimony	25.30	25.72	35.10
Sulphur	18.08	18.87	21.86
Total	99.64	100.00	100.00

I. Boulangerite from Cleveland mine
II. Theoretical composition of Boulangerite
III. Theoretical composition of Jamesonite

Teher would appear to remain no doubt, from the foregoing comparison, of the agreement of the Cleveland mine mineral with the boulangerite formula and its distinct difference from jamesonite, to which mineral there is a strong tendency to refer all such lead sulphantimonites. The locality is of interest by reason of the excellence of its specimens of this mineral and it is to be hoped that they may be widely distributed in collections before the mine is exhausted.

ENTOMOLOGY.—*A new Rugitermes from Panama.* THOS. E. SNYDER, Bureau of Entomology, U. S. Department of Agriculture.

During the summer of 1924, Nathan Banks, of the Museum of Comparative Zoology, Cambridge, Massachusetts, visited the Canal Zone and localities in nearby Panama. Some time was spent collecting on Barro Colorado Island, Canal Zone, the site of the station of the Institute for Research in Tropical America.

In addition to many other insects, Mr. Banks collected an interesting series of termites, including one new species of the subgenus *Rugitermes* Holmgren. Banks also collected the odd termite *Armitermes* (*Rhyncotermes*) *major* Snyder, of Costa Rica and Honduras, on Barro Colorado Island. Panama is a new locality for this interesting species. He has courteously allowed me to examine this collection of termites.

Mr. Banks' collection brings the termite fauna of the Canal Zone and nearby Panama, up to 38 species, representing 23 genera or subgenera, 22 of which, representing 16 genera or subgenera, occur on Barro Colorado Island.