a money bag, boot, arrow-head, geometrical figures, a seal, goose, fish, rooster, elephant, bird and a baby.

Prof. Hitchcock speaks of receiving a concretion from an able English geologist labeled, "Kimmeridge Coal Money (use and age unknown), found abundant in the Kimmeridge clay, Dorset coast—supposed turned in a lathe, and anciently used as money."

Three questions must be asked: How does the composition of a claystone differ from that of the surrounding clay, and is this composition definite?

What first determines the formation of a concretion?

What are the favorable and adverse conditions of which I have spoken?

Chemical analyses answer the first question by the following results:

Deerfield claystone (opposite Whitemore's ferry), contains, beside clay and iron, 42 p.c. carbonate of lime ($Ca\,CO_3$). Clay immediately surrounding claystone, 2–3 p.c. carbonate of lime. Claystone from south of Sunderland bridge, west shore, 43 p.c. $Ca\,CO_3$; surrounding clay, 2 p.c. Brattleboro claystone, 42 p.c. $Ca\,CO_3$. Hartford claystone, 47 p.c. $Ca\,CO_3$.[1]

The essential difference, therefore, between the clay and claystone, is the almost entire absence in the former of calcium carbonate. These figures show that the composition of concretions is not definite, although it does not vary greatly. We may say that nearly half a claystone is carbonate of lime, and as this is the active agent in the process of formation, we can appreciate Le Conte's appellation of "lime balls" in place of the popular name of "claystones."

The second question is much more difficult to answer. It requires the proof of the existence or non-existence of a nucleus. It has been generally believed that these nuclei exist. Prof. Hall, in the *Geological Report of New York*, speaks of concretions having for a nucleus either a gravel

[1] Prof. Hitchcock gives four analyses thus: 42, 48, 49 p.c. $Ca\,CO_3$, and one from Hadley which seems to be the exception to the rule, 56 p.c. $Ca\,CO_3$.