indicate without question the mutation of factors or elements in the germ-plasma.

2. Variation due to new combinations, or to recombinations of genes normally carried by a species (as in sex-dimorphism, polymorphism, etc.). This is the kind of variation we are most familiar with, and which has been the subject of so much experimental research. Not only may genes or determiners be shuffled in inheritance, as Mendel described, but those constantly present may be greatly modified by the unexpected appearance of others, which have until then escaped notice. Thus in the sunflower there is a series of pattern-factors, which only become evident when the factor for red rays enters the combination.

   In the case of the many mutants of *Drosophila* observed by Morgan, all within the limits of a single species, it is difficult to resist the conclusion that a process of subtraction is going on under our eyes, leaving combinations which are new in the sense of lacking some of the original elements. In other analogous cases, we are struck by the fact that the *same kinds* of subtractions occur in many different genera and species, showing that the tendency to perform these tricks is deep-seated in the protoplasm of the whole race. There is here involved a question which cannot be said to be settled, and to which much additional research must be directed.

3. Variation due to the direct action of the environment, which, as we have learned from Weismann, is not inherited. Nevertheless, the power to react to the environment in particular ways *is* inherited, and hence even these variations cannot be dissociated from the question of heredity.

On the negative side, as it were, we have the facts of palæontology. The study of fossil insects shows us that many apparently trivial characters, such as the arrangements of spots on wings, are of enormous antiquity. Not only this, but as Wheeler's researches on the ants of Baltic amber have shown, specialized habits and reactions are likewise millions of years old. It, therefore, becomes more probable that the phenomena of variation which we witness to-day represent, mainly at least, the shuffling of very ancient cards.

In the Canadian fauna, there are several notably attractive opportunities for the study of variation. I will refer now only to a single family of insects, with which I have been especially concerned in recent years; the Saturniidæ. The publication of Packard's Monograph (Memoirs National Academy of Sciences, vol. XII) brings the subject fairly up to date, and makes it convenient to go forward from the point there attained. The genus *Samia*, as represented in Canada, is extremely interesting. There is not only the question of the relationships of the species *cecropia*, *gloveri*, *columbia* and *rubra*, but *columbia* has in the west a remarkable race *nokomis* (Brodie), while *rubra* produces at Kaslo a form *kasloensis* Ckll. These are merely conspicuous outstanding facts; large collections from many localities, together with experimental breeding, will bring out innumerable details of interest. Another very interesting species is *Telea polyphemus*, the variations of which should be studied exhaustively, and compared with those of the great Asiatic silk-moths. The Hemileucidæ, also included in Packard's book, afford similar opportunities, and owing to their smaller size are somewhat more manageable.