interferometer having tubes 25 cm. long showed that, as the synthesis progressed, the refractive index of the mixture became somewhat greater than that of the helium alone.

During the past seven or eight months the plans for synthesizing the helide have been modified and the apparatus enlarged. All qualitative experiments made with the new apparatus have clearly indicated the formation of the helide $HgHe_{10}$ and have thus tended to confirm the accuracy of my earlier work. The new apparatus produces a larger quantity of helide, but the maximum percentage found mixed with the helium has never exceeded that obtained in my first experiments.

Using three differently formed synthesizers in series, I have now succeeded in obtaining a second helide of mercury. This also remains gaseous at the temperature of liquid air, and charcoal fails to absorb it.

During the synthesis of the second helide the pressure of the helium was unaffected. Taking the density of helium as 1, that of the mixture of helium and helide, when measured with an Aston microbalance, was found to be 1·150. The helide was decomposed by passing it over a red-hot platinum spiral and the mercury collected. Its weight was 0·0002714 gm. Assuming the formula of the helide to be HgHe, the calculated density of the mixture is 1·148. The close agreement between the measured and calculated values leaves no doubt as to the formula for the helide.

To account for the non-liquefaction of the helides at the temperature of liquid air, I was inclined to regard them as clouds of charged particles. On this point Prof. Soddy has been kind enough to give me his own views. He writes, "I do not think it likely that you have a cloud of solid or liquid particles passing through the liquid air, though it is perhaps a possibility to be borne in mind. . . . My own view is rather that a compound of helium is of a different category from any known chemical compound, as the completed ring of electrons which never act as valency electrons, must be so acting in this case. If so its properties cannot be inferred from those of known gases, and there is therefore no *a priori* reason to expect that it would be condensed by liquid air and charcoal. Its properties must be ascertained *de novo*, and none of them can be inferred from known chemical data." Prof. Soddy regards his views as speculative.

In conclusion, it may be added that experiments made with pure argon yielded results entirely negative. Prof. Soddy has suggested that it would be of interest to repeat the experiments with neon substituted for helium. This I propose doing as soon as I can either purchase or obtain the loan of some 20 c.c. of the pure gas. The presence of helium would obviously be detrimental.

J. J. MANLEY.

Daubeny Laboratory,
Magdalen College, Oxford,
March 25.

Ecotypes of Plants.

IN *Hereditas*, Bd. vi. (1925), which has just come to hand, there is an extremely interesting paper by Göte Turesson on "Plant Species in Relation to Habitat and Climate." This author has grown in Sweden upwards of 10,000 cultures of various types and races of certain widely distributed plants, in order to ascertain the precise nature of the forms inhabiting different environments. Particulars are given concerning about fifteen species, with numerous illustrations.

It is found that the species exhibit parallel "ecotypes," which it is proposed to designate by the names campestris, arenarius, salinus, subalpinus, and alpinus. These names are by themselves sufficient to indicate the nature of the habitat, and an experienced botanist will be able to imagine the character of the adaptive modification. However, these ecotypes are to be understood to include only hereditarily modified forms, and the immediate effects of the environment are placed in another category. It is shown that the several ecotypes are not produced whenever the conditions seem to call for them. They are sorted out from the genotypes which the plant is able to produce. Thus there are four species (of the genera Melandrium, Ranunculus, Rumex, and Geum) which produce "alpinus" ecotypes in Scandinavia, but not in the Swiss Alps, although the very same species exist in Switzerland. It is as if the plant produced the hand of cards, and the environment played the game. The five parallel sorts of ecotypes correspond with five common types of environments into which suitable varieties might enter and in which they prospered.

The author has done his best to correlate the several ecotypes with names already bestowed by botanists. In this he has not been altogether successful, the numerous available varietal names, based on herbarium specimens, being often not precisely applicable in the sense desired. Thus in *Spiræa ulmaria* the "variety denudata" is present in all three ecotypes studied, and although the type specimen of Presl probably belongs to one of them, the restriction of the name to this ecotype would quite contradict the original intention and general usage. It is therefore proposed that previous names shall be discarded in the type of work represented by the paper, and the ecotype names *campestris*, *arenarius*, etc., substituted, no matter what species is concerned. There are, however, numerous minor biotypes not covered in this way, and the author remarks in reference to *Leontodon autumnalis*: "To those, however, for whom the increase and the naming of 'new' biotypes is a particular pleasure, as well as to other intending bidders, I am willing to offer a couple of hundreds hitherto undescribed in a living and exquisite condition."

At this point it may be possible to question the adequacy of the author's methods. The ecotype names certainly have the very great advantage of being intelligible in a general sense, without further explanation. But ought we to be satisfied with this "general sense"? Mr. Turesson himself brings out very clearly the fact that parallel ecotypes of the same species in different regions may not be just alike. Thus, while the ecotype system is highly illuminating, it should not take the place of definite names accompanied by precise descriptions, and supported by type specimens in the herbaria. Also, it is not clear that the most minute analysis of the various biotypes will not after all furnish the necessary materials for an adequate synthesis. Probably the fault to be found with taxonomists is not connected with the minuteness of their analysis, but with the mechanical way in which much of the work has been done, in the absence of guidance from biological theory. We may even believe that the coming years will see the study of biotypes and phenotypes carried to extremes now undreamed of. The work will represent a fascinating game, out of which will emerge from time to time results of high practical and scientific value.

T. D. A. COCKERELL.

University of Colorado,
Boulder, Colorado,
March 12.