

seem neither sufficiently verified nor of general validity, although the interpretation in individual cases can generally be recognized as probable." In the sixth chapter the author discusses the manner in which the stuff of our dreams is woven into the final tissue, and he describes in detail the four main processes, viz., condensation, displacement, dramatization, secondary elaboration. In the final chapter, the obscurity of which is somewhat increased in the translation, the psychology of the dream activities is discussed in a general way. For this purpose Freud constructs a scheme of psychological activity which is extremely interesting and suggestive, but which on the other hand is peculiarly artificial.

Since its publication in the first German edition this book has met with a very mixed reception. The bible of the author's disciples, it has been derided by his opponents. Any person who has had to deal seriously with the problems of the psycho-neuroses and of the disordered mind in general, and who has been impressed with the value of the psychopathological principles derived from Freud's contributions for the general development of psychological and allied studies, will look upon this book as a serious contribution to a most important field. The more knowledge he has of the actual facts the slower will he be in dogmatically rejecting even those statements of the author which are unconvincing and apparently rather extreme. He probably is already firmly convinced of the truth of many doctrines which at an earlier stage of his own work he looked upon as equally far-fetched and perhaps even more absurd.

C. MACFIE CAMPBELL

*Tables Annuelles de Constants et Données Numériques de Chimie, de Physique et de Technologie.* Published under the patronage of the International Association of Academies by the international committee named by the Seventh Congress of Applied Chemistry (London, June 2, 1909). Vol. I. for 1910. Gauthier-Villars, Paris, University of Chicago Press. 1911. Quarto. Pp. xxxix + 727.

This first volume of the annual tables and numerical constants, published under the auspices of an international committee representing twenty-one countries, shows the prodigious undertaking assumed by the committee. The list of collaborators comprises no less than thirty-one distinguished scientific authorities, and the number of abstractors of scientific journals about three times as many. The book is divided into forty-six chapters, and the table of contents covers eighteen pages in French, German, English and Italian.

The material is admirably arranged, and to every table are appended the name of the investigator and a reference to the original memoir. Thus, every item may be verified by consulting the original publication. Every scientific worker in the fields covered by this volume has in condensed form the results of allied investigations and information relative to the original sources. Moreover, the general secretary offers to assist in obtaining fuller information concerning memoirs in journals not accessible to the reader.

It is difficult to conceive of any compilation of scientific data better adapted to furnish information to the investigator in physics, chemistry and technology. A close inspection of the contents of this volume reveals a wealth of data and a variety of subjects that command not only respect but admiration. The investigator has in this book an invaluable adjunct to his reference library of scientific books and periodicals. It will broaden his view of the particular field of research in which he happens to be engaged, and will give him collateral information relative to many other allied subjects. The fulness of this information is indicated by the data relating to conductivity of electrolytes and electromotive forces, which cover forty-six large quarto pages. Under the first come specific conductivities, molecular conductivities, constants of electrolytic dissociation, transport numbers, coefficient of pressure of electrolytic conductivity, conductivity of electrolytes in solvents other than water, conduc-

tivity of electrolytes in a mixture of solvents, and conductivity of a mixture of electrolytes in pure solvents. The tables of electromotive forces include those of normal cells, of transition cells, of concentration cells, the potential of simple electrodes, and divers unclassified electromotive force effects.

In addition to the above there are forty-seven pages devoted to data in general electricity and magnetism. Immediately following these are eight pages on radioactivity and ionization. The writer finds nothing on the Peltier effect or on the important subject of electrolytic thermo-electromotive force.

A bibliography is appended to every main division of the book. An alphabetical index would add much to the convenience of reference. The second volume for 1911 contains both a general and a special alphabetical list of all substances mentioned in both volumes.

HENRY S. CARHART

#### SPECIAL ARTICLES

##### AN ILLUSTRATION OF THE INFLUENCE OF SUBSTRATUM HETEROGENEITY UPON EXPERIMENTAL RESULTS

IN experimental breeding so much stress has been laid upon controlled fertilization that some other factors of importance for the obtaining of trustworthy results have been left too much out of account. The importance of heterogeneity in the substratum upon which the plants are grown as a possible source of error has been pointed out time and again. De Vries, for example, attaches great weight to this factor.

The purpose of this note is to give point to these warnings (too greatly neglected now) by showing how extrinsic influences may completely screen intrinsic tendencies.

In very extensive series of materials a positive correlation has been demonstrated between the weight of the seed planted and the number of pods on the plant into which it develops—that is, yield is higher in the plants from the heavier seeds. This is true without exception for twenty series, involving 13,099 plants, already published.<sup>1</sup> Further constants based

on 4,856 plants, are given below. Here the coefficient of correlation,  $r_{wp}$ , shows the relationship between the weight of the seed planted (in the conventional units of .025 gram range) and number of pods per plant, while the second term of the regression straight line equation,<sup>2</sup>

$$p = \left( \bar{p} - r_{wp} \frac{\sigma_p}{\sigma_w} \bar{w} \right) + r_{wp} \frac{\sigma_p}{\sigma_w} w,$$

shows the absolute change in number of pods per plant for each unit change in seed weight.

| Series                 | Number of Plants | Coefficient of Correlation and Probable Error | Regression Straight Line Equation |
|------------------------|------------------|-----------------------------------------------|-----------------------------------|
| GGH.....               | 583              | .208 ± .027                                   | $p = 1.931 + .539w$               |
| GGD.....               | 514              | .159 ± .029                                   | $p = -3.504 + .361w$              |
| GGDD....               | 342              | .137 ± .036                                   | $p = -1.967 + .279w$              |
| GGHH....               | 396              | .194 ± .033                                   | $p = -2.321 + .513w$              |
| GGD <sub>2</sub> ..... | 449              | .215 ± .030                                   | $p = -4.861 + .436w$              |
| GGH <sub>2</sub> ..... | 499              | .176 ± .029                                   | $p = -1.037 + .485w$              |
| GG.....                | 750              | -.368 ± .021                                  | $p = 17.418 - .403w$              |
| LG.....                | 182              | .066 ± .050                                   | $p = 2.351 + .134w$               |
| LL.....                | 1141             | -.009 ± .020                                  | $p = 7.245 - .012w$               |

The constants are in excellent agreement with those already published—fairly large and positive throughout—with the exception of the Golden Wax, the *L* series, and the *GG* culture of Burpee's Stringless. Those for the Golden Wax series, *LG* and *LL*, are sensibly zero; one is the smallest positive coefficient yet found while the other is negative in sign, though only a fraction of its probable error.

The coefficient for the *GG* series is in striking contrast to the others; not only is it numerically the largest value recorded, but it is negative in sign and unquestionably signif-

<sup>1</sup> Harris, J. Arthur, "The Relationship between the Weight of the Seed Planted and the Characteristics of the Plant Produced—I," *Biometrika*, Vol. 9, pp. 11-21. See also *Amer. Breed. Mag.*, Vol. 3, pp. 293-295.

<sup>2</sup>  $p$  = pods per plant,  $w$  = weight of seed planted. The bars indicate the means and the sigmas denote the standard deviations of the characters in question. Through a slip in the copying of the manuscript which I overlooked in the proofs, the second term of the regression formula is given the negative sign on p. 14, *Biometrika*, Vol. 9. The values in the calculated equations are of course correct.