

I propose to consider these points in reference to the skew frequency distributions discussed in a memoir in the 'Phil. Trans.' for 1895 (A, vol. 186, *et seq.*) in another place. The present memoir, however, shows that these skew distributions give results immensely more probable than the Gaussian curve, and thus confirms in the case of errors of observation the results already reached in the case of organic variation.

"Mathematical Contributions to the Theory of Evolution.—X. Supplement to a Memoir on Skew Variation." By KARL PEARSON, F.R.S., University College, London. Received May 22,—Read June 20, 1901.

(Abstract.)

In the second memoir of this series a system of curves suitable for describing skew distributions of frequency was deduced from the solutions of the differential equation

$$\frac{1}{y} \frac{dy}{dx} = \frac{b_0 + b_1x}{a_0 + a_1x + a_2x^2} \dots\dots\dots (i).$$

These solutions were found to cover satisfactorily a very wide range of frequency distributions of all degrees of skewness. Two forms of solution of this differential equation, depending upon certain relations among its constants, had, however, escaped observation, for the simple reason that all the distributions of actual frequency I had at that time met with fell into one or other of the four types dealt with in that memoir. A little later the investigation of frequency in various cases of botanical variation showed that none of the four types were suitable, and led me to the discovery that I had not found all the possible solutions of the differential equation above given. Two new types were found to exist—

Type V:  $y = y_0 x^{pe} - \gamma/x \dots\dots\dots (ii),$

with a range from  $x = 0$  to  $x = \infty$ , and

Type VI:  $y = y_0 (x - a)^{n_1} x^{-m_2} \dots\dots\dots (iii),$

with a range from  $x = a$  to  $x = \infty$ .

These curves were found to be exactly those required in the cases which my co-workers and I in England, and one or two biologists in America, had discovered led in the earlier Types I and IV to impossible results, *i.e.*, to imaginary values of the constants.

In the present memoir the six types are arranged in their natural order, and a criterion given for distinguishing between them. They are illustrated by three examples: (*a*) age of bride on marriage for a

given age of husband; (b) frequency of incidence of scarlet fever at different ages; and (c) frequency of "lips" in the Medusa *P. pentata*.

It is perhaps of some philosophical interest to note that solutions of (i) that had escaped the analytical investigation were first obtained from actual statistics which could not be fitted to any of the curves of my first memoir without imaginary values of the constants. So great was my confidence in (i), however, that before I discarded it I re-investigated my analysis of it, and was so led to these two additional solutions.

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"On the Structure and Affinities of *Dipteris*, with Notes on the Geological History of the Dipteridinae." By A. C. SEWARD, F.R.S., University Lecturer in Botany, Cambridge, and ELIZABETH DALE, Pfeiffer Student, Girton College, Cambridge. Received May 21,—Read June 20, 1901.

(Abstract.)

The generic name *Dipteris* instituted by Reinwardt in 1828 is applied to four recent species—*Dipteris conjugata* (Rein.), *D. Wallichii* (Hook. and Grev.), *D. Lobbiana* (Hook.), and *D. quinquefurcata* (Baker). *Dipteris Wallichii* occurs in the sub-tropical region of Northern India; the other species are met with in the Malay Peninsula, Java, New Guinea, Borneo, and elsewhere. It has been customary to include *Dipteris* in the Polypodiaceæ, and to describe the sporangia as having an incomplete vertical annulus. The authors regard *Dipteris* as a generic type which should be separated from the Polypodiaceæ and placed in a family of its own—the Dipteridinae, on the grounds that (1) the sporangia of *Dipteris* have a more or less oblique annulus; (2) the fronds possess well marked and distinctive characteristics; (3) the vascular tissue of the stem is tubular (siphonostelic), and not of the usual Polypodiaceous type.

For the material from Borneo and the Malay Peninsula, on which the anatomical investigation of *Dipteris conjugata* is based, the authors are indebted to Mr. R. Shelford, of Sarawak, and to Mr. Yapp, of Caius College, Cambridge. The fronds of the four species of *Dipteris* consist of a long and slender petiole and a large lamina, in some cases 50 cm. in length; in *D. conjugata* and *D. Wallichii* the lamina is divided by a deep median sinus into two symmetrical halves, but in *D. Lobbiana* and *D. quinquefurcata* the symmetrical bisection of the lamina is less obvious, the whole leaf being deeply dissected into narrow linear segments. The sori, which are without an indusium, consist of numerous sporangia and filamentous paraphyses, terminating in glandular cells. The sporangia are characterised by the more or less