6.2 *Siméon Poisson*

Siméon Denis Poisson (1781–1840) was born at Pithiviers, France. He was sent to study at the famous École Polytechnique of Paris and performed so well that he was exempted from the final exams and remained there as a professor for 40 years. He also held a great variety of supplementary posts and wrote 300 papers on mathematics, astronomy, and physics. Most famous at the time was his *Traité de Mécanique* (1811), but today he is best known for his presentation in 1837 of the exponential limit of the binomial distribution. Although the same result had been reached in 1718 by de Moivre (see Biography 5.1), the probability distribution so derived is now called the *Poisson probability distribution*.

Important as it has turned out to be, Poisson's achievement remained, nevertheless, practically unknown for more than 60 years. Attention was drawn to it in 1898 in a paper by Ladislaus von Bortkiewicz.[1] He noted how deaths of Prussian soldiers, caused by horsekicks, could be described as a Poisson process and how their number could be estimated by Poisson's formula. When examining the experience of 10 army corps over 20 years (a total of 200 observations), von Bortkiewicz found the absolute and relative frequency distribution as given in the first three columns of the accompanying table. That is, 109 of these records showed zero deaths, 65 showed one death, and so on. No army corps ever recorded more than four such deaths. Von Bortkiewicz calculated the weighted mean annual number of such deaths as

$$\frac{109(0) + 65(1) + 22(2) + 3(3) + 1(4)}{200} = \frac{122}{200} = .61,$$

and he introduced this value of μ in the Poisson formula:

$$p(R = x|\mu = .61) = \frac{e^{-.61}(.61)^x}{x!}.$$

The result, given in the last column of the table, closely matched the empirical probabilities shown in the relative-frequency column. (Note: You can confirm the von Bortkiewicz results with the help of Appendix Table F, using a value of $\mu = .6$.) From then on, the Poisson probability distribution has remained in the limelight.

Yearly Number of Deaths from Horsekicks, x	Absolute Frequency	Relative Frequency	Poisson Probabilities
0	109	.545	.544
1	65	.325	.331
2	22	.110	.101
3	3	.015	.021
4	1	.005	.003
	200	1.000	1.000

[1] *Das Gesetz der kleinen Zahlen* (Leipzig: Teubner, 1898).

Source: International Encyclopedia of Statistics, vol. 2 (New York: The Free Press, 1978), pp. 704–706.