

inches, the pressure perpendicular to the abdominal wall produced by the action of the abdominal muscles was

$$P = \frac{113}{2.937} = 38.47 \text{ lbs. per square inch,}$$

a result which differs little from that already found by calculation from the actual measurements of the muscles and curvatures.

II. "Tables of the Numerical Values of the Sine-integral, Cosine-integral, and Exponential Integral." By J. W. L. GLAISHER, Trinity College, Cambridge. Communicated by Professor CAYLEY, LL.D. Received February 10, 1870.

(Abstract.)

The integrals

$$\int_0^x \frac{\sin u}{u} du, \quad \int_{-\infty}^x \frac{\cos u}{u} du, \quad \int_{-\infty}^{\infty} \frac{e^{-u}}{u} du,$$

called the sine-integral, cosine-integral, and exponential integral, were used by Schlömilch to express the values of several more complicated integrals, and denoted by him thus,— $\text{Si } x$ ,  $\text{Ci } x$ ,  $\text{Ei } x$ ; the last function, however, is for all real values of  $x$  only another form of the logarithm-integral, the relation being

$$\text{Ei } x = \text{li } e^x.$$

These functions have since been shown to be the key to a very large class of definite integrals, and several hundreds have been evaluated in terms of them by Schlömilch, De Haan, &c., so that for some time they have been considered primary functions of the integral calculus, and forms reduced to dependence on them have been regarded as known.

Considering, therefore, the large number of integrals dependent on them for their evaluation, and their consequent importance as a means of extending the integral calculus, it seemed very desirable that they should be systematically tabulated, the only values which have previously been obtained being those of  $\text{Si } x$ ,  $\text{Ci } x$ ,  $\text{Ei } x$ ,  $\text{Ei } (-x)$  for the values  $x=1, 2, \dots 10$  calculated by Bretschneider, and printed in the third volume of Grunert's 'Archiv der Mathematik und Physik,' and a Table of the logarithm-integral published by Soldner at Munich in 1806.

The present Tables contain the values of  $\text{Si } x$ ,  $\text{Ci } x$ ,  $\text{Ei } x$ ,  $\text{Ei } (-x)$  for values of  $x$  from 0 to 1 at intervals of .01 to nineteen places of decimals, for values of  $x$  from 1 to 5 at intervals of .1, and from 5 to 15 at intervals of unity, to ten places, and for  $x=20$  to twelve places. Also values of  $\text{Si } x$  and  $\text{Ci } x$  only for values of  $x$  from 20 to 100 at intervals of 5, to 200 at intervals of 10, to 1000 at intervals of 100, and for several higher values to seven places; besides Tables of the maxima and minima values of these functions, corresponding in the case of the sine-integral to multiples of  $\pi$ , and in the case of the cosine-integral to odd multiples of  $\frac{\pi}{2}$ , also to seven places.