bryos. The largest litter of living kittens at term was nine (plus four stillborn). Exploratory laparotomy performed early in gestation in several instances revealed uteri packed with uncountable numbers of embryos; ovaries consisted of solid masses of corpora lutea. Total resorption or early abortion of the uterine contents occurred in three instances. Eight other cats that were given the hormones and were mated either failed to become pregnant or lost the embryos at early stages.

The hormones prepared by Becker were administered as follows: FSH subcutaneously for 3 to 8 days, followed by a single dose of LH intravenously on days 4–8. Matings took place on days 4–9. The main estrous season of cats is March to May. Estrum followed administration of FSH during November, December, and January in 20 of 22 cats; in one of the two failures FSH had been implanted beneath the skin in a pellet.

These experiments were discontinued during 1939 when our research needs changed. The method offered little hope of increasing the availability of full-term cat fetuses which we required for experiments on asphyxia neonatorum (*2*).

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References and Note

1. W. F. Windle, *Endocrinology* **25**, 365 (1939).
2. The only report on the experiments on asphyxia neonatorum in the cat appears as a footnote in W. F. Windle, *Neurological Deficits of Asphyxia Neonatorum* (Thomas, Springfield, Ill., 1958), pp. 31-32.

Lissajous Figures by Analog Computer

I. L. Finkle's letter (18 June, p 1541) concerning Lissajous figures generated by a digital computer warrants the reply that an analog computer is much better suited to this task. My Fig. 1 shows a Lissajous figure generated by a PACE TR-20 analog computer and drawn by a Moseley model 7000A x-y plotter.

The computer is wired to solve the differential equations for damped free oscillations:

$$\ddot{x} + 2\psi\dot{x} + \omega^2 x = 0,$$

where $\psi = \eta/2m$, $\omega^2 = g/L$, η is the coefficient of viscosity, m is the mass of the pendulum bob, and L is the length of the pendulum. The solution to this equation is

$$x = a\, e^{-\psi t} \cos\{[(\omega^2 - \psi^2)]^{\frac{1}{2}}\, t + \alpha\},$$

where a is amplitude, t is time, and α is the phase angle. Two such differential equations with different values of ω and ψ and different initial conditions, are solved simultaneously, with the solutions plotted along perpendicular axes. The frequencies can easily be made small enough so that the maximum speed of the plotter pen is not exceeded.

The advantages of the use of an analog computer are obvious: no approximation is needed, and the lines are properly curved; large size pictures may be drawn, limited only by the size of the plotter (usually at least 8½ by 11 inches, or 22 by 28 cm); no photographic process is involved, as with the CRT plotter. Even though the analog computer may take as much as 100 times longer than a digital computer, computer time is usually much cheaper for an analog machine than for a digital one. Thus the Lissajous figures are of superior quality and the cost is at least comparable.

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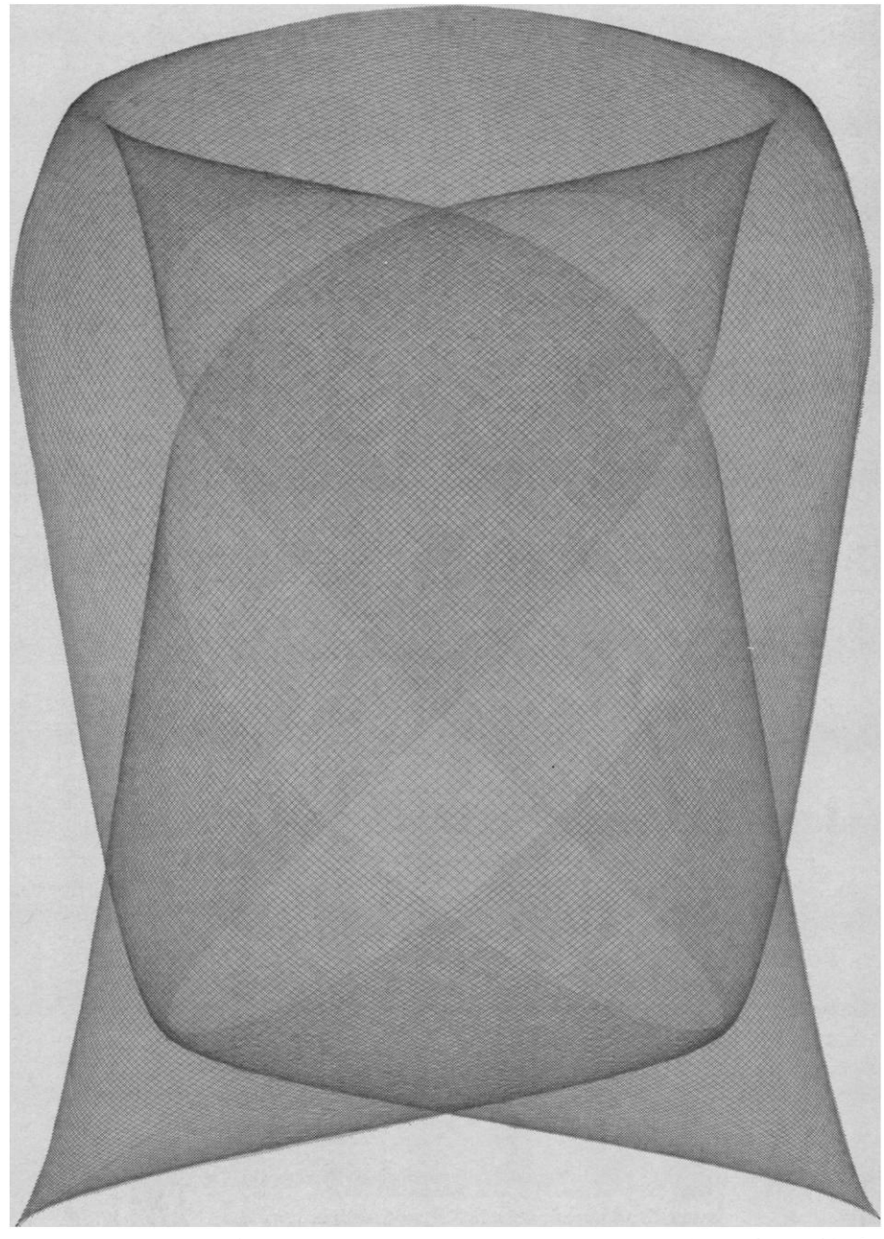

Fig. 1. A Lissajous figure produced by an analog computer and drawn by a 11- by 17-inch (28- by 43-cm) x-y plotter. Here $\omega_1/\omega_2 = 2.998/2.000$, $2\psi = 0.001$, $\alpha = 0$.