45°, so the mean *ground* components and total field for $t = 1958$ would be:

$$\overline{H}_{H} = 0.304(4/\pi) \int_0^{\frac{\pi}{4}} \cos \phi_m d\phi_m = 0.274 \text{ gauss}$$

$$\overline{H}_{V} = 0.304(8/\pi) \int_0^{\frac{\pi}{4}} \sin \phi_m d\phi_m = 0.227 \text{ gauss} \quad (14)$$

$$\overline{H}_{o} = \sqrt{\overline{H}_{H}^2 + \overline{H}_{V}^2} = 0.356 \text{ gauss}$$

The mean field $\overline{H}$ varies as the inverse cube of geocentric distance, which, for the present satellite, ranges between 1.10 and 1.62 earth radii. Using as first approximation to its orbit

$$r = a(1 - e \cos M)$$

where $a = 1.36$ earth radii, $e = 0.19$, and M is the mean anomaly of the satellite, the time mean field, according to Bauer's theory, surrounding Vanguard I is:

$$\overline{H} = (0.356/2.52\pi) \int_0^{\pi} \frac{dM}{(1 - 0.19 \cos M)^3} = 0.142 \text{ gauss} \quad (15)$$

evaluated by numerical integration.

Now, to obtain for comparison the total mean field implied by the measured effective field of Eq. 9, we assume the mean ratio (invariant with radius in a dipole field):

$$\overline{H}_{V}/\overline{H}_{H} = 227/274 = 0.8286 \quad (16)$$

given by Bauer's theory. Solving Eq. 9 approximately for the mean total field gives:

$$\overline{H} = \overline{H}_{\perp} \sqrt{\frac{1 + (0.8286)^2}{(0.8286)^2 \overline{\sin^2 \alpha} + \overline{\sin^2 \theta}}} \quad (17)$$

where, inserting the values found above, $\overline{\sin \alpha} = 0.637$, $\overline{\sin \theta} = 0.941$, and $\overline{H}_{\perp} = 0.115 \pm 0.001$ gauss, we find:

$$\overline{H} = 0.138 \pm 0.001 \text{ gauss} \quad (18)$$

as the mean total field implied by rotational damping. The agreement with the theoretical value given by Eq. 15 is satisfactory.

Perturbations in the mean effective couple on Vanguard I are to be expected to result from the regression of orbital nodes (3.019° per day), the advance of perigee (4.408° per day), the space-wandering of the spin axis, and the temperature variation of satellite resistivity. There seems to be perceptible evidence of such perturbations in the slightly wavy track of the radio-observed points in Fig. 1, but a precise study of such small effects would seem to await (i) frequent optical observation of reflections from some more efficiently designed satellite shape, such as a specular polyhedron (*6*), (ii) axis-orientation data, and (iii), experimental determination of satellite electrical and magnetic properties. The optical spin rate for Vanguard I on 10 January 1959 of 0.673 rotations per second, obtained from a Smithsonian Astrophysical Observatory photograph (*7*), which fits closely to the empirical curve of Fig. 1, would seem to be a first step toward more precise rotational studies.

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6 July 1959

Simplified Way to Cultivate Chick Kidney Cells and Maintain the Culture without Serum

Abstract. Chick kidney fragments were easily dispersed after incubation in trypsin solution for 1 hour at room temperature. The centrifuged cells were resuspended in Melnick's growth medium, diluted to 100 ml for each pair of kidneys, and seeded at 1 ml per tube. The cultures were maintained for 7 days or longer in the medium modified by replacing the serum with tryptose.

The methods of preparing cell suspensions by means of treating minced tissue with 0.25-percent trypsin solution reported by Youngner (*1*) and Bodian (*2*) required the use of a magnetic stirrer and took considerable time. In the course of a study of propagating avian viruses in chick kidney cell culture, a simplified technique for the preparation of the culture was sought (*3*). It was felt that, in order to avoid virus inhibitors or specific antibodies in animal serum in the culture system, development of a nonserum-containing maintenance medium which would maintain the culture for a period of a week would be desirable.

The cell culture was prepared from the kidneys of 1-week-old chicks. Kidney fragments were incubated at room temperature for 1 hour in 0.25-percent trypsin solution, prewarmed to room temperature, 10 ml being used for each pair of kidneys. The mixture was shaken vigorously by hand for 3 to 5 minutes until the pink tissue fragments disappeared. After the cell suspension had been centrifuged at 800 rev/min for 10 minutes, the sediment was resuspended in growth medium and filtered through four layers of gauze. The filtrate was further diluted with medium to a total volume of 100 ml for each pair of kidneys used. One milliliter of the cell suspension was seeded into each tube. A dense, full, cell sheet developed in 5 days. Melnick's growth medium was used; it contained 0.5 percent lactalbumin hydrolyzate (*4*), 10 percent calf serum, and 100 units of penicillin, 100 μg of streptomycin, and 100 units of mycostatin, respectively, per milliliter, in Hanks' (*5*) salt solution.

The culture was changed to maintenance medium as soon as a full cell sheet formed. The maintenance medium contained 0.5 percent lactalbumin hydrolyzate, 0.5 percent tryptose (Difco), and antibiotics, in Hanks' salt solution with 0.07 percent sodium bicarbonate. The culture remained in good condition for 7 days or longer. This maintenance medium has been used with satisfactory results for avian encephalomyelitis virus titration and neutralization tests which usually require 5 to 7 days' incubation.

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A Nomenclature for Conformations of Pyranoid Sugars and Derivatives

Abstract. A system is presented for designating, with symbols, all chair and boat conformations of all pyranoid sugars and derivatives. For chairs, these symbols are *CA* and *CE*: for boats: B_1A, B_1E, B_2A, B_2E, B_3A, and B_3E. Symbols *A* and *E* describe an axial or equatorial "glycosidic" group of the α-anomers (D and L series).

A recent note by Guthrie (*1*) on a system of nomenclature for sugar conformers prompts us to describe one that we have devised. The two systems are much alike, but ours appears to be more concise. Features common to the two are: (i) use of carbon atom 1 as the point of