scanning, to be followed, if necessary, by examination under high power and other procedures for differential diagnosis of the suspected cells.

An extensive investigation of vaginal and endocervical smears, with particular attention directed to nonmalignant proliferative and malignant processes, is at present being carried through. Also the applicability of the AO technique to cell suspensions and wet preparations is under investigation. Other papers giving results, as well as a more detailed description, are in preparation (*11*).

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8. Abbreviations used are AO for acridine orange; DNA for desoxyribonucleic acid; RNA for ribonucleic acid.
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10. Black-and-white photographs show neither the brilliance nor many details easily visible in the fluorescence picture. Some color photos are reproduced in 7.
11. We take pleasure in thanking Leo Kaplan, head of the pathology department of this hospital, for his valuable contribution of material and pathological diagnosis.

12 September 1956

Consistent Running Records

The two articles by M. H. Lietzke (*1, 2*) on track and other athletic records follow closely the pattern developed by previous workers in the study of the time-distance relationship. A particularly close parallel is to the pioneer work of A. E. Kennelly (*3, 4*), who plotted a straight-line log-log curve for all the activities Lietzke studied (men and women running, walking, swimming, skating, rowing; horses running, trotting, and pacing; men bicycle-riding and automobile-driving). Like other students besides Kennelly (*5–9*), Lietzke worked out a series of consistent performances (limited to men's running records) (*2*) by choosing a set of "best efforts" (220-yard, 1-mile, and 1-hour runs) that fit his curve. He then calculated the change in existing records required to reduce the times so that they would fall on the log-log straight line. Many of the calculated times are not consistent with history and experience in track athletics (Table 1), the best example being the present 1-mile record of 3 minutes, 58 seconds (3:58) and Lietzke's calculated 2-mile record of 8:22 (fractions of seconds are purposely omitted in this discussion).

The 1-mile record has been reduced in the past 50 years by more than 17 seconds, and during the same period the 2-mile record has come down about 36 seconds, with the interim marks keeping step with each other. To argue that the 2-mile distance will never be run in 8:22 would be extremely rash, but it can be predicted with reasonable certainty that the man who establishes the 8:22 mark will be able to run a mile in 3:54 or under.

A. W. Francis (*7*), using the records of 1943 when the 1-mile record was 4:02.6 and the 2-mile was 8:47.8, computed from his formula for a hyperbola that the time for the mile should be 3:58.7 and for the 2-mile 8:37.2, both slightly higher than present figures, but consistent with track history.

I was convinced many years ago (*6*) that the straight-line log-log function did not accurately fit the facts. Kennelly (*3, 4*), whose early work has never been fully appreciated by track specialists, was careful to call his logarithmic formula "An approximate law of fatigue in running animals." A modern student will be startled to find that exactly 50 years ago, Kennelly (*3*) calculated from his straight-line log-log relationship that the mile could be run in 3:58.1, but the prediction loses its force because his formula also equated this 3:58 mile with a 50.1 quarter mile run and a 23-second 220-yard run, both about 7 percent slower than the then-existing records. Lietzke, and others before him, have avoided these obvious inconsistencies by plotting their curves through the best marks only, but the inconsistencies still show in the calculated records if the attempt is made to squeeze the relationship into a straight-line log-log formula.

Table 1. Relationship between 1-mile and 2-mile running records for various dates.

Date	Record (min : sec)		Remarks
	1 mi	2 mi	
1905	4:15	9:09	
1931	4:10	8:59	Both records held by Paavo Nurmi.
1937	4:06	8:53	No great 2-mi runner in this period.
1944	4:01	8:42	Both held by Gundar Haegg (2-mi later reduced to 8:40).
1955	3:58	8:33	Iharos, the 2-mi record holder, has run 1500 m in 3:40.8.

A definitive time-distance relationship for athletic records must be based on a full knowledge of the history, experience, and practice in the various events and probably on physiological considerations as well, rather than on statistical data only. The research of Franklin M. Henry (*10, 11*) may lead to a formula that satisfies all these requirements.

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21 August 1956

George P. Meade is right when he mentions that a definitive time-distance relationship for track records should probably be based on physiological considerations as well as statistical data. The work of Franklin M. Henry in which an attempt is made to analyze the various biochemical factors that enter into a rate equation for running seems to me to be the correct approach to this problem. When the rate-determining processes that occur in the body during running have been sufficiently elucidated, it should be possible to derive a rate equation that will fit the pattern of observed records very closely at all distances.

In the absence of a rate equation that generated closely the pattern of the rate-versus-distance plot for all running events, I used the log-log relationship in my own calculations of the consistency of present racing records. The log-log plot seems to fit the observed records over a wider range than any other single relationship. However, the use of the log-log plot is most certainly an oversimplification. A plot of the rate equation based on physiological considerations may remove the inconsistencies that Meade has pointed out. It would be very nice if Franklin Henry could reach the point in the derivation of his rate equation where he could suitably isolate the various combinations of rate-determining biochemical reactions that occur in the body as a function of the distance run so that the shape of the rate curve could be determined prior to any consideration of the actual records. Whether this can be done remains to be seen.

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26 September 1956