eliminate backlash. Rotation of the shaft is prevented by a spring-loaded phosphor-bronze key which is soldered to the shaft and which engages a longitudinal slot in the barrel. There is a tendency of the upper end of the shaft to bend sideward slightly when the thimble is turned, producing a rotation about the slot as fulcrum or center. This is prevented by a washer (not shown in Fig. 1) that fits the shaft snugly and is soldered to the top of the barrel after the shaft has been inserted. End-play of the thrust bearing at the top of the thimble can be adjusted by means of the setscrew in the upper pointer. The total backlash of the thimble owing to this source and to looseness of the thread can be kept down to 15 μ without causing stiffness.

The chamber has been used in the department of physiology at Johns Hopkins University for studies of the first auditory and first somatic areas of the cerebral cortex of the cat (*6*). When the electric activity of a single neuron has been isolated, it is usually possible to record the activity as long as desired, although tests of this point beyond a few hours have not been made. On a few occasions, ball-and-socket joints have been made in the Plexiglas ring for introducing either gross electrodes for recording and stimulating or a cannula for local perfusion of the cortex. A later model of the microdrive has been made with a metric thread of ½ mm pitch.

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Elevation of Platelets in Mid-Cycle: an Indication of Ovulation

Three methods to determine the time of ovulation in women have been generally accepted: (i) interpretation of graphs of basal temperature; (ii) cytologic examination of vaginal fluid; (iii) endometrial biopsy. Changes in the genital tissues would be expected to be delayed until after rupture of the Graafian follicle, whereas systemic reactions such as temperature elevation or alteration of blood elements might be expected to give a more prompt indication of ovulation. During a prolonged study of a female patient with essential thrombocytopenic purpura, it was observed that the platelets consistently reached their highest levels during ovulation, as determined by basal temperature graphs (*1*).

The present study (*2*) was concerned with variations in platelet levels during repeated menstrual cycles and with correlation of these platelet levels with the time of ovulation, as determined by basal temperature records. Twenty-six young women were studied. Twenty had normal cycles, four had been oophorectomized, and two were pregnant. Nine hundred seventy platelet counts (*3*) were done during 78 menstrual cycles for a 6-month period. Daily oral temperature recordings were kept by each woman. Daily platelet counts were performed in nine women for at least one complete menstrual cycle, and in the remainder of the women approximately 15 counts in each cycle were done mainly during menstruation and during the mid-cycle. Fifty-one cycles were complete and considered adequate for analysis.

The platelet levels in the 26 women varied from 70,000/mm³ to 462,000/mm³ with a mean of 217,000/mm³. Fluctuations of platelet levels from day to day ranged from 5000 to 30,000 in 46 cycles. In five cycles, however, the changes were considerable, varying from 40,000 to 80,000 from day to day, excluding ovulatory peaks and menstrual dips.

Following menstruation, the platelets either remained constant or rose gradually during the next 2 weeks (Fig. 1). In mid-cycle, the levels usually rose suddenly and dramatically within 24 hours, reaching the highest point during the entire cycle. Within another 24 hours, the platelets returned to their previous levels. In some cycles, this acute rise and fall of platelets was as high as 140,000. In nine cycles (17.7 percent) of eight patients, the platelet levels rose gradually and less dramatically during 2 to 3 days but always reached a peak during mid-cycle.

After the mid-cycle rise and fall, the platelet levels remained constant or decreased gradually until the onset of the next menstrual period and were lowest on the first or second day of the menstrual period. The platelets were found to be at equal levels on the first and second days of menstruation in 38 cycles (74.5 percent).

When the platelet levels were correlated with basal temperature graphs during the same menstrual cycle of patients with biphasic temperature records, the highest point of the thermal shift was found to coincide with the highest elevation of the platelets in 22 cycle (43.1 percent). In four cycles (7.8 percent) the platelets reached their highest values at the time of the temperature dip, whenever such a temperature drop was present. In nine cycles (17.7 percent) where no temperature dip was noted, the platelet peak occurred 24 hours before the temperature reached the highest eleva-

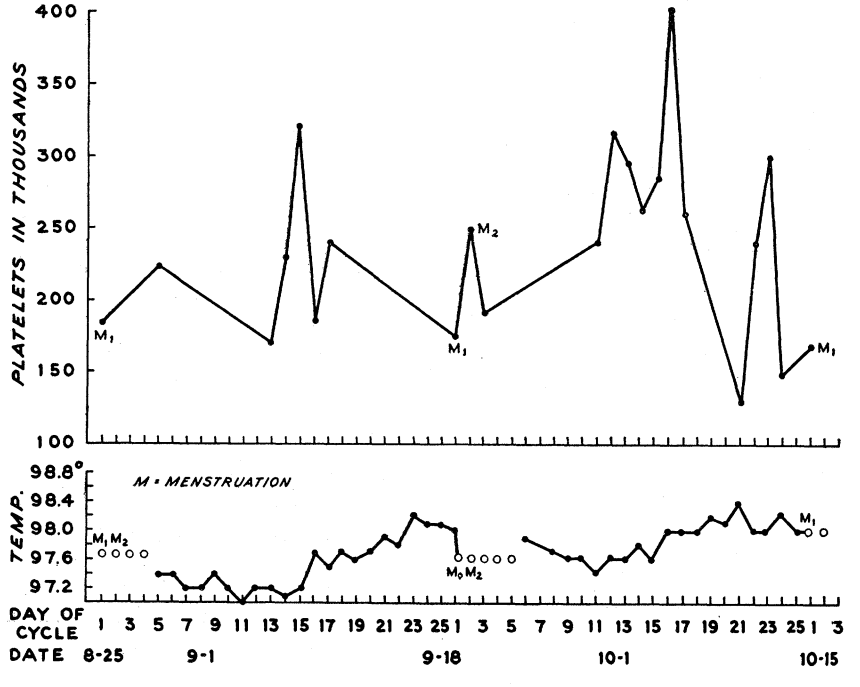

Fig. 1. Platelet levels and basal temperature during two successive biphasic menstrual cycles.

Table 1. Platelet levels in normal, oophorectomized, and pregnant women.

	Normal			Oophorectomized	Pregnant
	Control	Ovulation	Menstruation		
Number	537	49	140	95	19
Range	100,000–390,000	230,000–430,000	100,000–380,000	70,000–400,000	120,000–290,000
Mean	217,000	303,000	215,400	186,400	190,200
Standard deviation	±49,200	±53,800	±53,400	±60,200	±51,200

tion. Therefore, in 35 cycles (68.6 percent) the platelet peaks coincided with the temperature shift from the low to the high phase. In nine cycles (17.7 percent) the platelet values were highest 24 hours after the temperature shift. In four cycles (7.8 percent) the platelet peaks followed the temperature shift by 48 to 72 hours, and in three cycles (5.9 percent) the platelet peak preceded the temperature shift by 48 to 72 hours. Thus, in 86.3 percent of cycles the platelet peak occurred during the thermal shift or within the following 24 hours.

Two women recorded both monophasic and biphasic temperature graphs. In the biphasic cycles, the platelet peaks coincided with the temperature shift. When the temperature graphs were monophasic, generally assumed to indicate an anovulatory cycle, the platelets also reached a peak during the mid-cycle, a finding suggesting that ovulation may have occurred. In four cycles, *Mittelschmerz* occurred in mid-cycle on the day of the platelet peak. Four oophorectomized and two pregnant women showed no cyclic pattern of platelet counts done daily or bidaily.

The ranges, mean values, and standard deviations of the platelet counts during the ovulatory peaks and during the menstrual dips were determined. The same was done with the remainder of the platelet counts which were considered control values (Table 1). There were no significant differences between the control values and those during menstruation. Although there were no significant differences between the control levels and those of pregnant women ($T = 1.62$, $P = 0.25$), the control levels of normal women were significantly higher at the 5-percent level ($T = 3.65$, $P = 0.05$) than those of oophorectomized women. The ovulation levels were significantly higher at the 1-percent level ($T = 7.96$, $P = 0.015$) than the control levels.

It has been generally accepted that the basal temperature shift from the low to the high phase is indicative of ovulation and that ovulation may immediately precede or follow the temperature shift. Since the platelet peaks occurring in every mid-cycle were sharp and were usually characterized by a sudden rise in a 24-hour period, platelet levels may be of greater value in establishing the time of ovulation than the basal temperature graphs, especially when the temperature shift to the high phase is gradual and prolonged for several days. The close association of the platelet peaks and the temperature shift suggests that the platelet peak may be coincidental with ovulation in the vast majority of menstrual cycles. Platelet levels are currently being determined in a number of sterile patients, and intercourse or artificial insemination are planned to coincide with the platelet peaks in mid-cycle.

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Multiple Glaciation since the Ice Age

The proposal that there has been a number of distinct glacial periods since the retreat of the Wisconsin glaciation is relatively new (*1*), although moraines corresponding to an age older than our present glaciers, but younger than Wisconsin age, have been recognized for some time (*2*). It is the purpose of this report to acquaint others working in this field of study with the availability of a tremendous amount of unevaluated data on this subject in the Sierra Nevada Range in California.

The existence of moraines a few thousand feet down-valley from some of the ice-cored moraines in the Sierra Nevada, but several miles up-valley from the nearest Wisconsin moraines, was recognized in 1949 (*3*). The significance of these moraines did not become apparent until 1951, when the same pattern of a series of moraines a short distance below the ice-cored moraines was observed at two glaciers on the north side of Dana Plateau, just outside Yosemite National Park. The interesting observation was the similarity between the modern, ice-cored moraines associated with the advances during the last 5 centuries (*4*) and the pattern of the older moraines in the canyon a short distance below. A series of closely spaced morainal loops suggested that the earlier glaciation had followed the same pattern as the present glaciation, with a number of advances of almost equal intensity.

Inspection of a collection of aerial photographs (*5*) of the Sierra Nevada crest from Mount Conness to the Middle Palisade indicates that this pattern of multiple glaciation since the ice age is typical of the Sierra Nevada. This conclusion seems unquestionable after stereoscopic examination of approximately 300 of an estimated total of 500 cirques for the entire range, most of which contain moraines with the characteristic form and appearance that indicates the presence of an ice core. The cirques usually contain active glaciers or small ice accumulations indicative of recently extinct, modern glaciers. Older moraines, distinctly separate from the modern ice-cored moraines, occur in 94 of these cirques. In 28 additional cirques, the older moraines are present, but modern ice-cored moraines are either absent or their existence is doubtful. It is likely that the percentage of cirques containing older moraines is higher than indicated, for many may exist which cannot be identified in the aerial photographs.

The criteria used for estimating that the second group of moraines is older than the group of modern, ice-cored moraines are their form, appearance, and position with respect to ice-cored moraines. The latter are readily identified by their fresh appearance, thickness, evidence of instability and avalanching at their margins, proximity to an active glacier, or similarity in appearance to other moraines that can be identified with little doubt. Only two of the older moraines have actually been inspected in the field by me. Their stratigraphy or the development of soil profiles has not been studied, although there is soil and plant growth on one of the two moraines visited.

Two cirques near Mather Pass in the southwest corner of the Bishop (California) quadrangle have three distinctly different sets of moraines, including modern, ice-cored moraines. Other cirques at Ragged Peak and Mount Wallace have two sets of moraines of apparently different ages, and the youngest of the moraines do not appear to have any ice core. The cirques are partially filled with talus. Crandell and Waldron (*6*) report moraines of three different ages at Emmons Glacier on Mount Rainier, Wash-