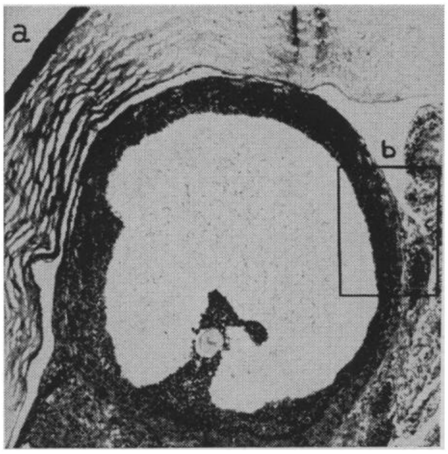

Fig. 1. Mature ovarian follicle in the anterior chamber of the rabbit eye. (*a*) Section through cornea; (*b*) section of wall shown in Fig. 2 (Gomori trichrome, about × 75).

lightly anesthetized rabbit. Implants were made into both eyes of several animals. Contractions were observed in one eye in each of two animals. The contractions involved individual follicles and caused changes in shape from the spherical to the elipsoidal form.

Implanted follicles grow, become filled with fluid, contain an ovum, and remain turgid for several months (Fig. 1). Figure 2 shows the organization of the follicular wall and the presence of spindle-shaped cells. We assume that these cells are the smooth-muscle cells that give rise to the contractions.

Contractions may be induced by several methods. Subcutaneous injection of 2 ml of ether-extracted urine obtained from pregnant women during their first trimester induced the appearance of contractions from 8 to 180 minutes after administration of the urine. The frequency of contraction was between 1 and 5 per minute. It is well established that ovulation in the rabbit occurs 9 to 10 hours after either mating or cervical stimulation (*5*). Nine hours after electrical stimulation of the cervix contractions appeared and persisted for approximately 2 hours. Marked contractions followed the application of a homogenate, prepared from an acetone-extracted rat pituitary, to the surface of the eye. This response is not obtained by direct application to the cornea of one drop of 1:100,000 epinephrine, one drop of 0.1-percent solution of acetylcholine, or one drop of 1 USP unit (oxytocic activity) of posterior pituitary extract. Hence it is very likely that the force responsible for the delivery of the ovum from the follicle is the series of contractions that pass over the ripe ovarian follicle, and that these are induced as a result of the release of luteinizing hormone.

A complete hypothesis of ovulation probably involves (i) release of the ovulation-inducing hormone, tentatively assumed to be luteinizing hormone (*6*); (ii) modification of the germinal epithelium by proteolysis (*7*); (iii) rapid swelling caused by increased secretory activity or depolymerization, or both, of the constituents of the liquor folliculi with a consequent increase in osmotic pressure (*8*); and (iv) contractions of smooth muscle in the theca externa to assist the rupture of the thecal wall at the stigma and facilitate the ejection of the intrafollicular contents. Such a mechanism appears necessary to account for the continued ejection of the intrafollicular contents after the pressures caused by osmotic forces are neutralized after rupture (*9*).

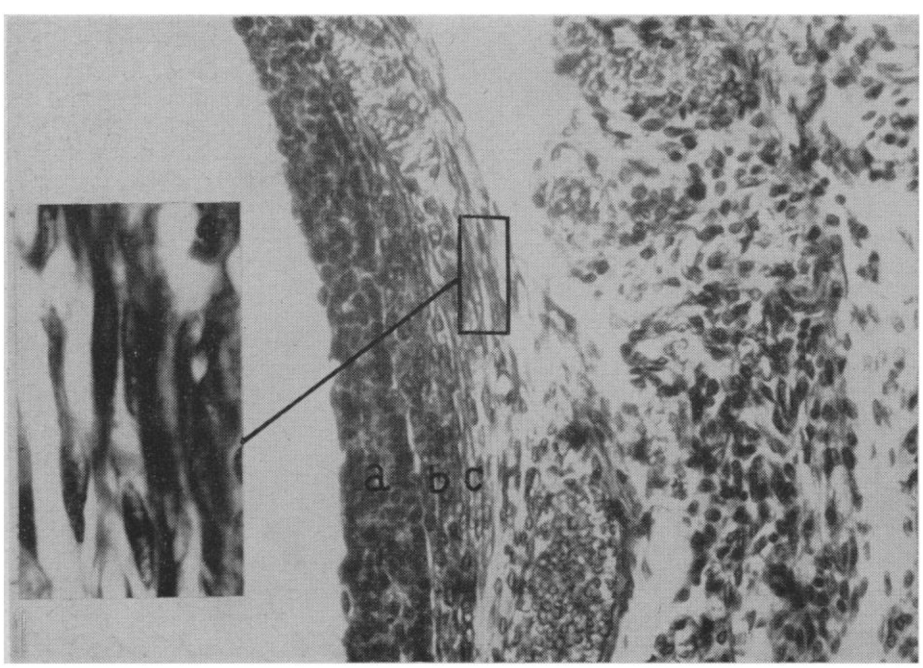

Fig. 2. Segment of thecal wall containing three layers: (*a*) granulosa; (*b*) theca interna; (*c*) theca externa (Gomori trichome, × 380). Inset shows *c*, at magnification of 1000, composed chiefly of spindle-shaped smooth-muscle fibers.

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9. This research was supported in part by FSU Research Council grant-in-aid No. 036-21 and Public Health Service grant No. A-1904.

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Finite Radiocarbon Dates of the Port Talbot Interstadial Deposits in Southern Ontario

Abstract. Three new finite radiocarbon dates suggest that (i) the thermal maximum of the Port Talbot interstadial occurred prior to 47,000 years before the present and (ii) the interstadial deposits were overridden by a glacial advance approximately 44,000 years before the present. To facilitate correlations with other areas, new rock-stratigraphic names are proposed for the Port Talbot type section.

New stratigraphic divisions of the last ice age, several of them older than the classical Wisconsin glacial stage, have been proposed by Dreimanis (*1*) since 1957. Unfortunately the radiocarbon dates of the principal new unit, the Port Talbot interstadial, were not finite. These dates (samples L-185A, L-217A, L-370A, L-440, W-100, S-7, and S-46; see *1*, *2*) ranged from older than 25,000 to older than 40,000 years. Therefore, several readers of the articles cited (*1*) and participants of the Friends of the Pleistocene 1959 field conference (*3*) have expressed doubt that this interstadial is younger than the last, or Sangamon, warm interglacial.

H. de Vries considered it worth while to try to obtain new radiocarbon dates, beyond the previous range of dating, at the Radiocarbon Laboratory of the University of Groningen. We collected gyttja from the Port Talbot interstadial site in the summer of 1958, but subsequent examination showed that the sample was unsuitable because recent rootlets were present. We took a new sample, a monolith of about 25 pounds of gyttja, at the type section of the Port Talbot interstadial in July 1959 [6 ft inside the base of the cliff, at the 56-ft point of the geologic section, as shown in Fig. 2 of (*4*)]. The silt and gyttja surrounding the monolith were checked carefully, and no rootlets were found.

The first date, obtained from an unenriched sample of the gyttja (Gro-2570), was 47,000 ± 2500 years before the present (B.P.) (*5*). The final date (Gro-2597 and Gro-2601), after enrichment, was in very good agreement: 47,500 ± 250 years B.P.; the error of ± 250 is the statistical error in the activity only, and does not include the errors in the enrichment factors (*6*).

The new finite dates refer to the second half of the Port Talbot interstadial, for a palynological study (*7*) suggested that the gyttja was younger than the thermal maximum of this interstadial. The underlying silt, deposited during the first half of the interstadial, contained only a few organic remains, not enough for radiocarbon dating.

New fragments of wood were found in 1959, also in the till (f_1) which overlies the Port Talbot interstadial beds. Wood from this area has been previously dated (samples S-46 and L-440), also giving infinite dates. The new finite date (Gro-2580) is 44,200 ± 1500 B.P. (*8*). It is in very good agreement with the dates of the stratigraphically older gyttja, indicating the time when the Port Talbot interstadial deposits became overridden by a glacial advance in the central portion of Lake Erie basin.

The new Groningen radiocarbon dates make it possible to outline the preclassical Wisconsin stratigraphic units in southwestern Ontario more accurately than before. To facilitate correlation with other similar Pleistocene sections, Dreimanis proposes new local rock stratigraphic terms for the drifts overlying and underlying the Port Talbot interstadial beds, as shown in Table 1.

Frye and Willman (*9*) have recently proposed a revised classification of the Wisconsin stage of the Lake Michigan lobe, suggesting that the Farmdalian substage was a major interval of glacial withdrawal. Comparison of radiocarbon dates indicate that the Plum Point interstadial may be correlated with the Farmdalian. Only one glacial substage (the Altonian), older than the Farmdalian, has been proposed for the Lake Michigan lobe by Frye and Willman. The Port Talbot section suggests at least two glacial substages and one interstadial Wisconsin substage in the Lake Erie lobe area of southwestern Ontario before the Farmdalian (*10*).

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Table 1. Wisconsin glacial and interstadial deposits at Port Talbot, Ontario.

New local stratigraphic names (with comments on C^{14} ages)	C^{14} Age and reference No.	Previous stratigraphic terms 1958 (*11*)	Previous stratigraphic terms 1957 (*12*)
Port Stanley drift		Upper tills (h) and (j), lacustrine clay (i)	Clayey upper till No. 4, lacustrine clay
Lake Erie interstadial beds (*13*)		Unconformity (lacustrine deposits elsewhere)	Lacustrine clay and silt
Catfish Creek drift		Sandy lower till (g)	Sandy lower till No. 3
Plum Point interstadial beds (not *in situ*–C^{14} dates of wood from the Catfish Creek drift)	24,600±1,600 (L-217B) 27,500±1,200 (W-177) 28,200±1,500 (L-185B)	Plum Point interstadial wood (reworked)	Plum Point interstadial
Southwold drift		Clayey gravel (f_2), till (f_1), lacustrine clay (e)	Gravelly lower till No. 2; gravel, lacustrine clay
Port Talbot interstadial beds		Port Talbot interstadial gyttja and silt (c)	Port Talbot interstadial gyttja and silt
a) end of the interstadial: wood in the Southwold drift	44,200±1500 (Gro-2580)		
b) second half of the interstadial: gyttja	47,500±250 (Gro-2597 and Gro-2601) 47,000±2500 (Gro-2570)		
Dunwich drift		Lowermost till (a) and varved clay (b)	Sandy lower till No. 1 and varved clay

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6. ———, letter of 23 Nov. 1959. H. de Waard (12 Jan. 1960) mentions another reference number (Gro-2597/2601) with the same date.
7. A. Dreimanis, *Ohio J. Sci.* **58**, 74 (1958).
8. H. de Vries, letter of 24 Oct. 1959.
9. J. C. Frye and H. B. Willman, *Illinois State Geol. Survey Circ. No. 285* (1960).
10. This report grew out of correspondence between Hessel de Vries and me in 1959, and the first draft was on its way from Canada to the Netherlands when de Vries died. I assume responsibility for the wording of the report, hoping that opinions of the late Hessel de Vries have been expressed correctly. I appreciate very much the cooperation of H. de Waard, who is continuing de Vries' work at Groningen and who supplied the following additional information in a letter dated 8 March 1960:
    A peat ball which I found on the Lake Erie shore at the Port Talbot interstadial type location has been dated 44,900 ± 1000 years B.P. (Gro-2619). This date is in good agreement with de Vries' dates for the Port Talbot interstadial deposits. De Vries suggested also redating of the Plum Point larchwood (see W-177 and L-185B in Table 1). The new date reported by de Waard is 27,250 ± 130 years B.P. (Gro-2625). It is in excellent agreement with the other two dates, and more accurate.—A. D.
11. A. Dreimanis, *Ohio J. Sci.* **58**, 82 (1958).
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13. These deposits are called the "Erie interstadial" in A. Dreimanis, *Contrib. Dept. Geol. Univ. Western Ontario No. 25* (1959), p. 28.
* Deceased.

1 February 1960