

Steroids and Upjohn: A Profile of Chemical Innovation – Photos

(unless other wise cited, all photos are from the publicly-accessible website: www.upjohn.net)

The early years (pre-1949) of adrenal cortex extracables at The Upjohn Company

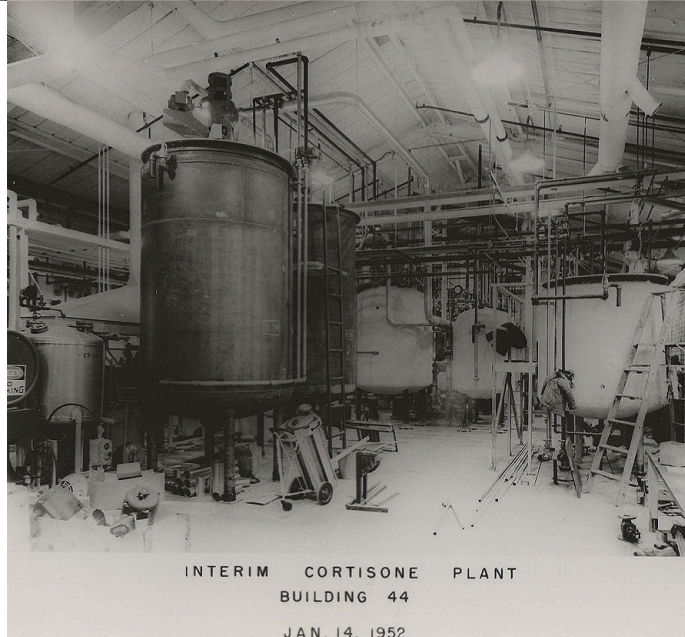
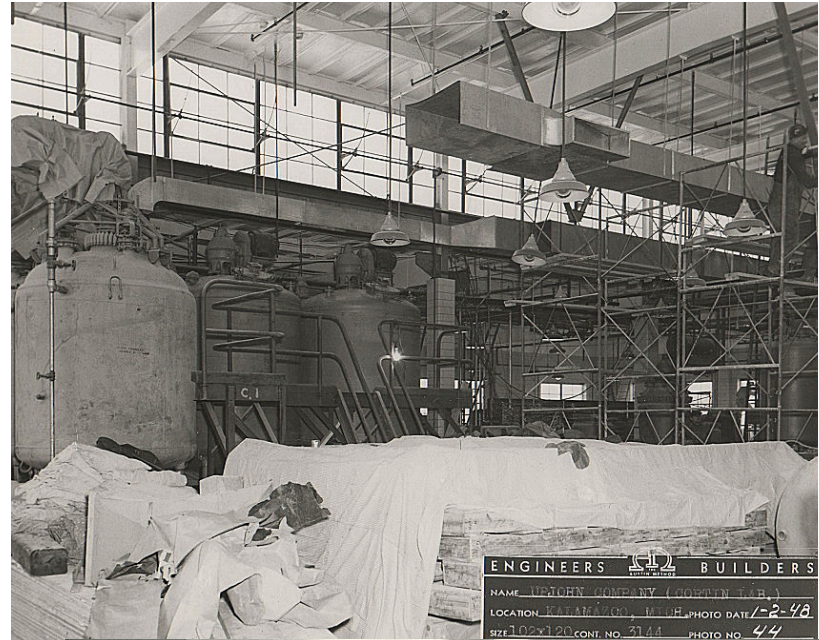
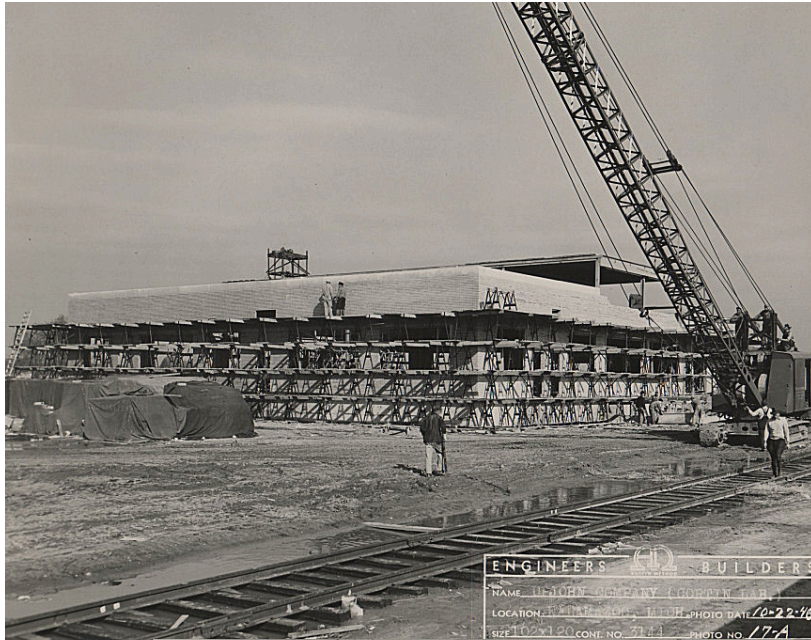


Figure 2 George C. Cartland and Marvin H. Kuizenga.



Cartland and Kuizenga photo from:
J.A. Hogg. Steroids, the steroid community, and Upjohn in perspective: a profile of innovation. *Steroids*, 1992, 57, 593-616

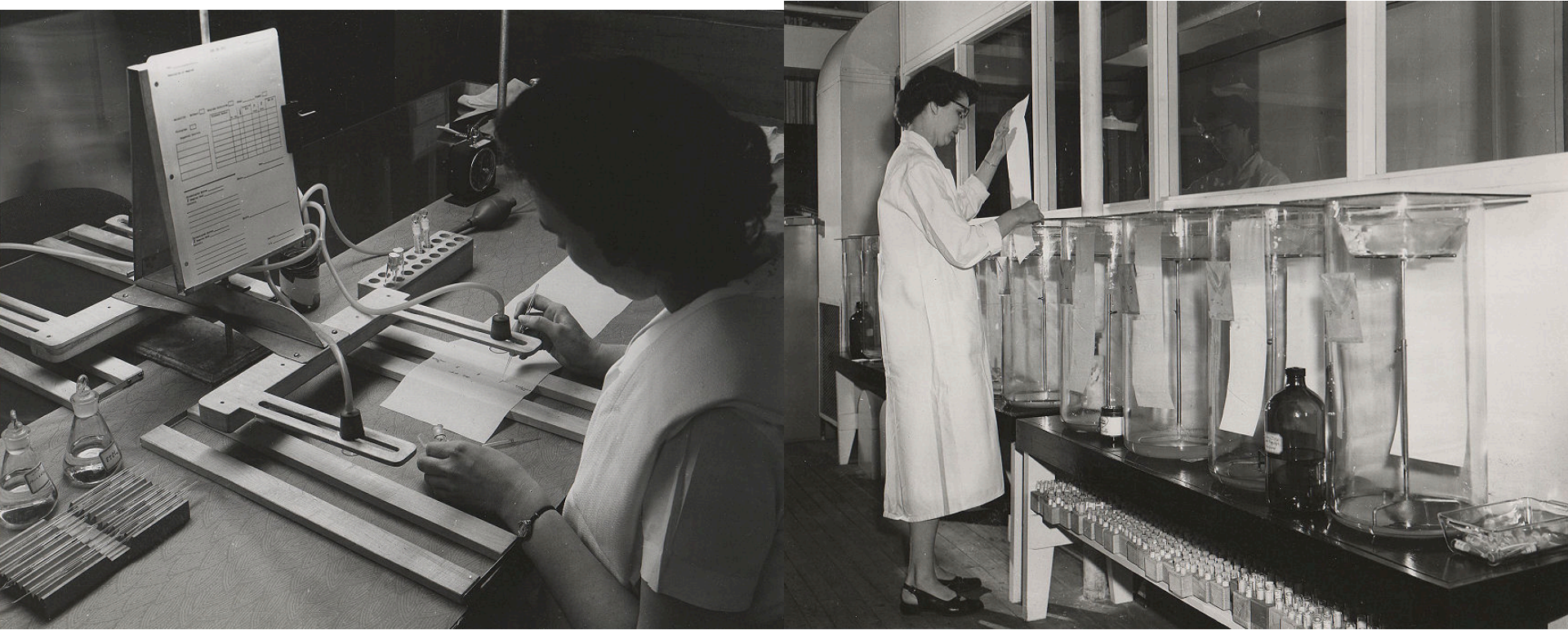
Upjohn Company's 1946-1952 Kalamazoo site expansion for steroid manufacture



Early cortisone research (1949-1950) – screening new microorganisms for bio-conversion reactions



Early cortisone research (1949-1950) –
analyzing new microorganism screening samples for reaction products using paper chromatography



Early cortisone research (1952-) –
Murray-Peterson Team



Kalamazoo--The Upjohn Company research team responsible for development of a new fermentation process for the production of cortisone---a process in which microorganisms perform in a single step what previously required a complex, costly series of chemical operations. The team of microbiologists, biochemists and organic chemists are, left to right:

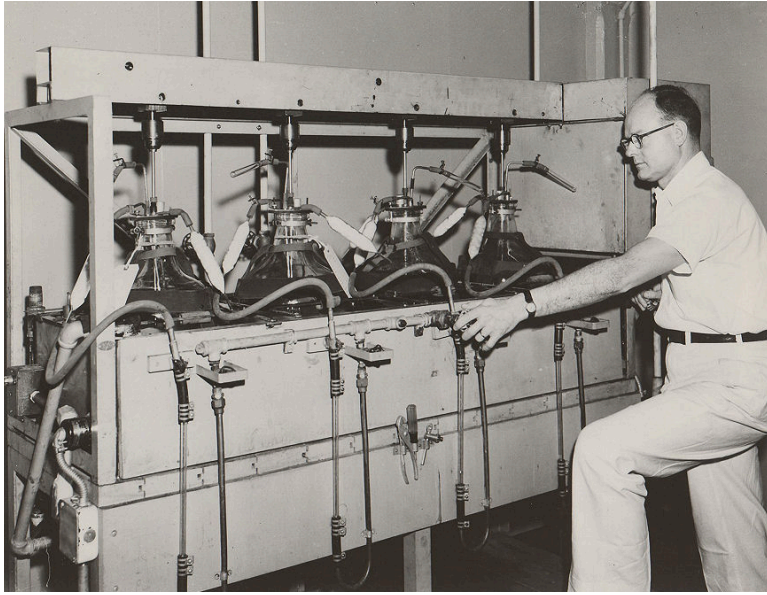
L. M. Reineke, Dr. R. H. Levin, Dr. D. H. Peterson, Marian H. Leigh, Dr. Adolph Weintraub, Dr. H. C. Murray, Dr. P. D. Meister. (Other members not present for the picture: Dr. S. H. Eppstein and Dr. R. B. Edwards.)

Early cortisone research (1952) –

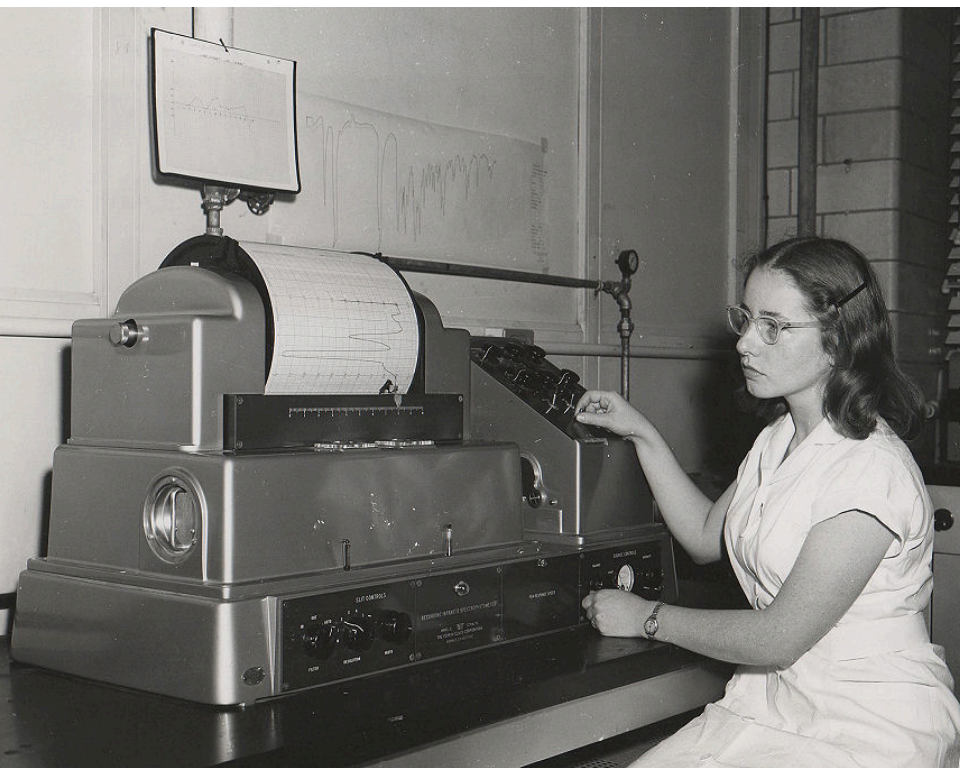
Hazel Marion Leigh Osborn, member of the Progesterone Microbiological Transformation (Murray-Peterson) Team



Early cortisone research (early 1950's) –
Fermentation scale-up (5 gallons), oxygenated progesterone product recovery, and drying of final crystals



Early cortisone research (early 1950's) –
Product Analysis, optical rotation by polarimetry (left) and chemical structure by IR spectroscopy (right)





Early hydrocortisone and cortisone production (early 1950's)

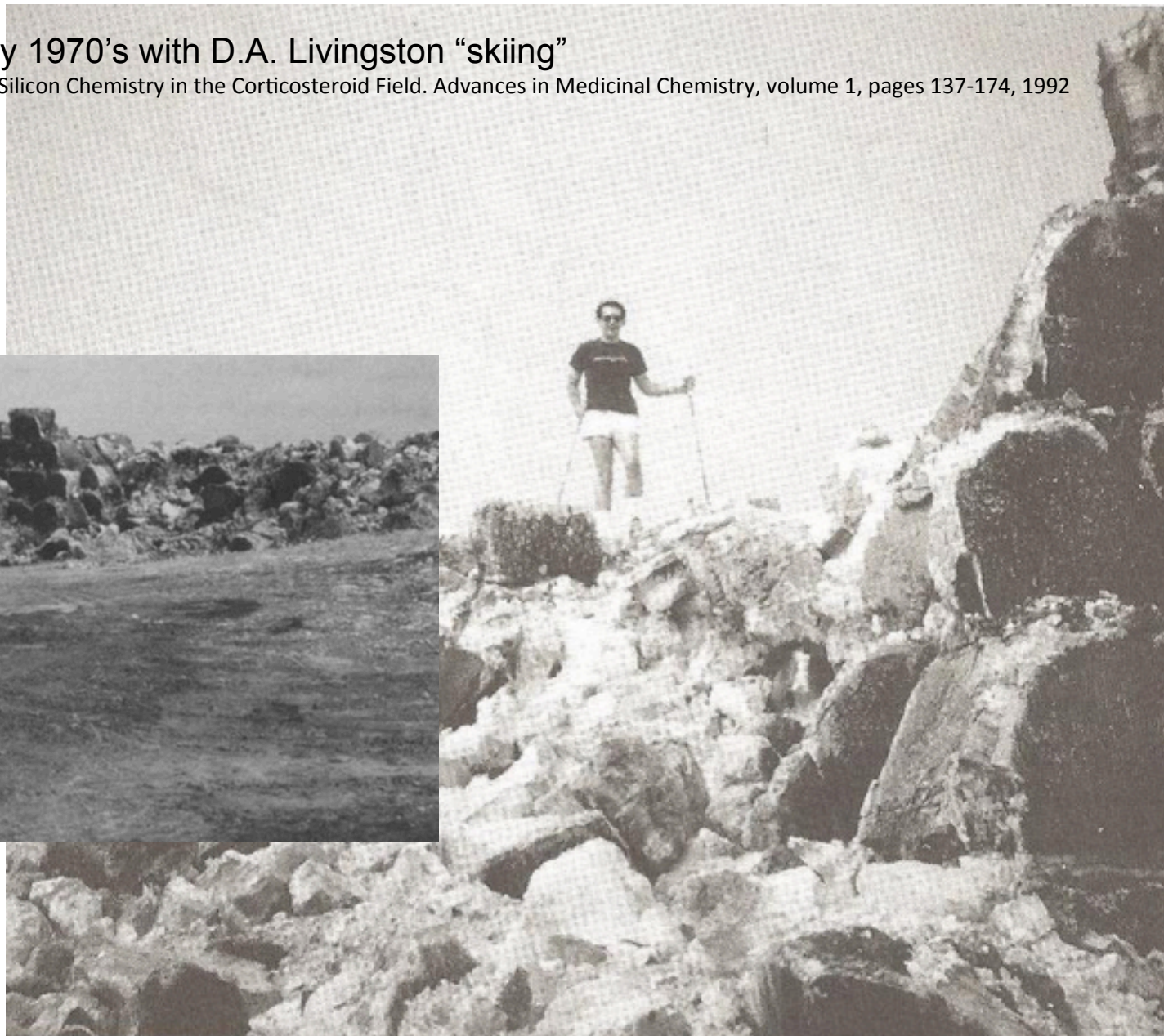


Sitosterol stockpile 1960's (inset)

from: J.A. Hogg. Steroids, the steroid community, and Upjohn in perspective: a profile of innovation. *Steroids*, 1992, 57, 593-616

Sitosterol stockpile early 1970's with D.A. Livingston "skiing"

from: D.A. Livingston. Application of Silicon Chemistry in the Corticosteroid Field. *Advances in Medicinal Chemistry*, volume 1, pages 137-174, 1992



Sitosterol Microbiological Transformation (Wovcha) Team (mid-1970's)



Upgrading manufacturing facilities (1980'S)



Julie L. Hohler, Chemical Processing, monitors one of Building 335's automated systems. The building produces mainstream intermediates for the steroid ingredients of *Provera* products and hydrocortisone and meets or exceeds all known environmental requirements.

New facility called world's most advanced

Examples of various Upjohn corticosteroid products over time showing wide range of dosage forms – solid, liquid, ointments, providing wide range of delivery options – oral, topical, injectable

