irradiated animals grafted with "foreign" marrow. To achieve this end, prediction and control of such reversal or balancing will require an understanding of dynamics and interactions of both the host and donor marrow systems.

Summary. Host and donor pigeons made immunologically tolerant in various combinations by skin grafting shortly after hatching were exposed to lethal doses of irradiation at the age of 8-10 months. Homologous bone marrow transplants gave the following results:

1) The tolerant state of the host did not appreciably affect survival; *i.e.*, mean survival of Group 1 (host tolerant of donor) was 23.4 ± 5.6 and of Group 4 (no known tolerance) was 25.3 ± 4.1 days.

2) Tolerance of marrow donors for host increased mean survival by about 10 days (34.2 ± 4.3 for Group 2 and 35.6 ± 5.2 for Group 3). Differences in mean survival between combined Groups 1, 4 and 2, 3 were statistically significant ($p<.05$).

3) These data suggest that the immunologic mechanism of the donor is more important than that of the host in producing "homologous disease" in the pigeon.

1. Symposium on Antibodies: Their Production and Mechanism of Action, *J. Cell. Comp. Physiol.*, 1957, v50, (Suppl. 1).

2. Van Bekkum, D. W., Recovery and Therapy of the Irradiated Organism, from *Mechanisms in Radiobiology*, H. Errera and A. Forsberg, eds., Academic Press, New York, 1960, pp297-360.

3. Barnes, D. W. H., Loutit, J. F., *Nucleonics*, 1954, v12, 68.

4. Congdon, C., *XXI Congreso International De Ciencias Fisiologicas*, 1959.

5. Trentin, J. J., *Ann. N. Y. Acad. Sci.*, 1958, v73, 799.

6. Makinodan, T., PROC. SOC. EXP. BIOL. AND MED., 1956, v92, 174.

7. Trentin, J. J., *ibid.*, 1956, v92, 688.

8. Uphoff, D. E., Law, L. W., *Radiation Res.*, 1957, v7, 456.

9. Shaw, D. H., Vermund, H., *Proc. Nat. Acad. Sci.*, 1959, v45, 23.

10. ———, PROC. SOC. EXP. BIOL. AND MED., 1961, v107, 414.

11. Cannon, J. A., Longmire, W. P., *Ann. Surg.*, 1952, v135, 60.

12. Shaw, D. H., *Ann. N. Y. Acad. Sci.*, 1962, v97, 153.

13. Feldman, M., Yaffe, D., *J. Nat. Canc. Inst.*, 1958, v21, 697.

14. Uphoff, D. E., Law, L. W., *ibid.*, 1959, v22, 229.

15. Evans, A. E., *N. Y. State J. Med.*, 1961, v61, 1837.

16. Mathe, G., Jammet, H., Pendic, B., Schwarzenberg, L., Duplan, J. F., Maupin, B., Latarjet, R., Larrieu, M. J., Kalic, D., Djukie, J., *Clin. et Biol.*, 1959, v4, 226.

17. Beilby, J. O. W., Cade, I. S., Jelliffe, A. M., Parkin, D. M., Stewart, P., *Brit. Med. J.*, 1960, p96, Jan. 9.

18. Makela, O., Nossal, G. J. V., *J. Immunol.*, 1962, v88, 613.

19. Denhardt, D. T., Owen, R. D., *Transplant. Bull.*, 1960, v7, 394.

Received October 1, 1962. P.S.E.B.M., 1963, v112.

Effect of Ecdysone on Incorporation of C^{14}-Leucine into Hepatic Protein *in vitro*.* (27996)

WALTER J. BURDETTE AND ROBERT L. CODA

Laboratory of Clinical Biology, Department of Surgery, University of Utah College of Medicine, Salt Lake City

Previous studies(1) indicated that ecdysone, the growth and metamorphosis hormone of insects, may have an effect on mammalian cells also, even though no material yielding a positive bioassay was obtained from human tissues when methods of extraction yielding positive results in insects were used(2). Growth of mammalian cells in tissue culture was inhibited by the hormone(3,4), and a few regressions of sarcoma 180 occurred after injection of ecdysone. In a continuation of

* Aided by grants from Nat. Inst. Health, U. S. Public Health Service, Department of H.E.W., and Am. Cancer Soc.

TABLE I. Effect of Ecdysone on Incorporation of C^{14}-Leucine* into Hepatic Protein *in vitro*.

Ecdysone (Calliphora units per ml)	No. of samples	Mean† counts per min per mg protein per hr	Mean† increase in counts per min per mg protein per hr	P	% increased incorporation (mean c.p.m.)	% samples with increased incorporation
100	8	482	46	.9	11	25
0	8	436				
250	12	458	197	.03	75	100
0	12	261				
500	7	433	192	.0002	80	100
0	7	241				
1000	4	468	427	.003	1041	100
0	4	41				

* 10 μm.
† Corrected for self absorption, adjusted to 10 millicuries per millimole.

these studies, active hormone was added to the fraction of mammalian (murine) liver obtained from centrifugation of homogenates at 14000 $\times$ *g*, and results were compared to samples without the hormone. DL-leucine labeled in position one with C^{14} was added, and amount of incorporation into protein from zero time for a period of 30 minutes was determined by plating the insoluble material precipitated by trichloracetic acid and counting in the proportional range(5,6,7). (Removal of sources of energy from the system resulted in failure of synthesis to occur in both control and experimental groups, eliminating the possibility that they were supplemented by the hormonal extract.)

As much as a 10-fold increase in incorporation of leucine occurred when ecdysone was present in the preparation (Table I). The level of incorporation was increased significantly (t test) when ecdysone was present in concentrations of 250 c.u. or more per ml and the activity of leucine in each experiment adjusted to 10 millicuries per millimole. The effect was more pronounced with higher doses, and a threshold was present above a concentration of 100 c.u. per ml.

Although animals were fasted and conditions of study maintained as nearly constant as possible, results of determinations of uptake vary from one preparation to another. However, when the values for control and experimental values for paired samples from a single preparation are compared, those containing ecdysone (>100 c.u.) have a higher uptake in every case. The evidence therefore suggests that extracts of *Bombyx* containing ecdysone activity (*Calliphora* test) enhance the rate of synthesis of mammalian protein *in vitro*. These results with mammalian tissue and the observations of Clever and Karlson(8,9) that the appearance of puffs on the salivary chromosomes of *Chironomus* is selectively induced by the same hormone encourage the view that continued exploitation of hormonal heterophyly may be profitable in relation to growth and differentiation in both vertebrates and invertebrates.

The advice of Dr. Sherman Dickman is gratefully acknowledged.

1. Burdette, W. J., *Proc. 8th Internat. Cancer Cong.*, 1962, in press.
2. ———, PROC. SOC. EXP. BIOL. AND MED., 1962, in press.
3. ———, *ACTA Unio Internat. contre Cancrum*, 1960, v16, 157.
4. Burdette, W. J., Richards, R. C., *Nature*, 1961, v189, 666.
5. Hultin, T., von der Decken, A., in R. J. C. Harris (ed.), *Protein Biosynthesis*, Academic Press, N. Y., 1961, 83.
6. Zamecnik, P. C., *The Harvey Lectures 1958-1959*, Academic Press, N. Y., 1960, 256.
7. Hersko, A., Amoy, S., Mager, J., *Biochem. Biophys. Res. Comm.*, 1961, v5, 46.
8. Clever, U., Karlson, P., *Exp. Cell Res.* 1960, v20, 623.
9. ———, *Chromosoma*, 1961, v12, 607.

Received October 1, 1962. P.S.E.B.M., 1963, v112.