

the goitrogenicity of soybean oil meal and the poor reproduction noted in this report. This goitrogenic factor could act primarily as a stimulant on the hypophysis. Excess of the thyrotropic hormone thus produced would account for the marked hyperplastic and hypertrophic changes in the thyroid glands of birds on a low iodine ration. It would also account for the depressed reproduction, either through excess thyroxine, or through an excess of gonadotropic hormone, or both. The fact that the thyroid gland is closely inter-related to the ovary in the reproducing female would lend additional support to this assumption.

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Experimental Infection of the Rabbit with Duval's Chromogenic *B. leprae* Culture.

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Many attempts have been made to infect the lower animal with fresh human leprosy tissue rich in the bacillus of Hansen and with acid-fast cultures isolated from the lesion of human leprosy. While Sugai,¹ Kedrowski,² Duval,³ *et al.*, claim that leprosy may be induced experimentally, there is no mention of a progressive type of infection having occurred.

Since doubt exists as to the causal significance of Duval's chromogenic acid-fast culture of leprosy, the author has attempted to clear up the matter through a comparative study of the lesions produced in the rabbit with Duval's culture and certain well known saprophytic acid-fast bacilli and to determine whether the experimental infection is progressive and becomes generalized.

Saline suspensions of Duval's chromogenic bacillus of human leprosy and cultures of *B. phlei* and *B. smegmatis* were used for the injection of the animals. Fifty normal full grown rabbits were employed. The animals were inoculated either subcutaneously, intravenously or intraperitoneally with 2 cc of a heavy suspension of the various cultures. Each animal received 3 injections in all at weekly intervals over a period of 3 weeks. The animals were sacrificed at varying intervals and autopsies were performed for cul-

¹ Sugai, T., *Lepra*, 1909, **8**, 203.

² Kedrowski, W. J., *Ztschr. f. Hyg.*, 1901, **37**, 52.

³ Duval, C. W., *J. Exp. Med.*, 1910, **13**, 374.

tural and tissue studies. Sections of the organs from the autopsied animals were properly prepared for microscopic studies.

Special cultural methods were employed in the recovery of the acid-fast bacilli from the infected animals, especially where recovery of the bacillus was attempted months after the infection had been induced.

It is significant that the cultivation of Duval's acid-fast bacillus from the experimental lesion was difficult in direct proportion to the microbe's sojourn in the tissues of the host. In the instance where lesions were produced with the acid-fast saprophytes, cultures of these readily grew out in 24 hours upon the ordinary laboratory media.

Early in the infection the recovered culture was obtained from the lesions in 48 hours at incubation of 37°C, while 20 days were required to obtain growth on special culture media where the infection had lasted for 6 months.

Duval and Harris report that saprophytic acid-fast microbes produce lesions in the rabbit only where repeated massive doses are injected. No lesions were noted or cultures recovered in any of my *B. phlei* or *B. smegmatis* animals that were sacrificed 3 months after the last injection.

While the gross lesions in the various rabbits inoculated with Duval's culture were not typical of human leprosy, the microscopic tissue changes were identical. Constituting the lesions were aggregations of lymphoid, epithelioid and the so-called "lepra" or "foamy" cells, whose nuclei were crowded to the periphery by the intracytoplasmic colonization of acid-fast bacilli. Free extracellular acid-fast bacilli were also observed. Extensive fibrosis was noted in many of the affected tissues.

Summary. Duval's chromogenic acid-fast culture recovered from the tissues of human leprosy produced lesions in the rabbit that microscopically are identical to those of the human disease. The infection is progressive over a period of 6 to 8 months. It is significant that the causal microorganism steadily increases in number throughout this period.

The chromogenic acid-fast bacillus of Duval was recoverable from the experimental lesions as late as 8 months after the last inoculation. *In vitro* cultivation was more difficult in direct ratio to its residence in the host animal.

In the control animals (*B. phlei* and *B. smegmatis*) no gross or microscopic lesions were observed one month after the last injection. No culture was obtained or acid-fast bacilli observed in the tissues

of the control animals which were sacrificed 3 months after the last injection.

The results of the experiments herein reported show that Duval's chromogenic acid-fast bacillus induces a chronic form of infection in the rabbit with characteristic tissue changes deep in the parenchyme of the various organs.

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Further Studies in the Elimination of Certain Dyes by Gastric Mucosa.

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Studies on the elimination of dyes by the gastric mucosa have been made by several investigators with general agreement in results except for the report of Morrison, *et al.*¹ A comprehensive list of dyes was investigated, and their secretion into the stomach noted by Dawson and Ivy,² Kobayashi,³ and Ingraham and Visscher.⁴ The last named investigators confirmed the conclusion of Kobayashi that only basic dyes, *i. e.*, those having the chromogen in the electro-positive ion, are secreted by the gastric glands. In addition, they clarified the anomalous intragastric appearance of certain dyes, ordinarily classed as acid, following their intravenous injection (noted by Dawson and Ivy). This previously inexplicable phenomenon has been shown to be due to the amphoteric characteristics of certain dyes, and to alterations of charge on the chromogen upon reversible reduction. A review of the data of Dawson and Ivy, Kobayashi, and Ingraham and Visscher, with these facts in mind, indicates general agreement and leads to the conclusion that only those dyes in which the chromogen can be electro-positive are secreted by the stomach. In a more recent study Morrison, Reeves, Gardner¹ have reinvestigated the excretion of dyes by the gastric mucosa in Pavlov pouch dogs. Congo red, an acid colloidal dye, as well as 8 other acid dyes, were found by these

¹ Morrison, Samuel, Reeves, David L., and Gardner, Raymond, E., *Am. J. Dig. Dis. and Nut.*, 1936, **3**, 551.

² Dawson, A. B., and Ivy, A. C., *Am. J. Physiol.*, 1925, **73**, 304.

³ Kobayashi, K., *Acta scholae Med. Univ. Imp. Kioto*, 1926, **8**, 465.

⁴ Ingraham, Raymond C., and Visscher, Maurice B., *J. Gen. Physiol.*, 1935, **18**, 695.