nection it may be significant that qualitative nitrite tests made on the solutions, after standing in the laboratory for 2 weeks, gave negative results in Experiment 1 and positive results in Experiments 3, 4 and 5, showing a reduction of nitrate to nitrite apparently through the action of calcium, magnesium or bicarbonate ion, depending on the respective cases.

Toxicity was also obtained by substituting potassium for a portion of the sodium as indicated by comparison of Experiments 7 and 8. It is true that a larger total was fed in the case of the potassium mixture but it should also be noted that toxicity appeared shortly after administration of the second dose. In the 8 experiments listed in Table II the minimum dose was 0.83 gm. and the maximum 3.5 gm., 6 of the experiments using practically a constant amount of 2.2 to 2.5 gm. In all 8 cases the relatively non-toxic salts sodium chloride and sodium sulphate compose 76.0 to 97.1% of the total.

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Promotion of Healing by Benzoyl Peroxide and Other Agents.

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This is a study designed in part to test the suggestion of the late Prof. A. S. Loevenhart that certain organic peroxides (benzoyl peroxide in particular) should be superior to anything now employed for the healing of skin lesions. This is because of their antiseptic action, without protein precipitation, by the slow but continuous liberation of "active" oxygen in contact with living tissue, and because of a supposed beneficial effect of this liberated oxygen on the healing process. Failure of these agents to coagulate protein should be a weighty argument in their favor, since it may be claimed that antiseptics which have this action delay healing to just that extent. Some evidence in support of these views was furnished by Loevenhart.[1]

Experimental: About 25 square cc. on the inner surface of the leg below the knee was shaved, washed and dried. By means of a small pipette, 0.1 cc. concentrated sulphuric acid was applied to

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[1] Loevenhart, A. S., *Therap. Monatshefte*, 1905, xii, 426.

each of 8 spots, 2 cm. apart, within the area. Each drop of acid was allowed to remain on the skin for 10 seconds, when it was wiped off. The spots became yellow and pained, and within 15 minutes the area became erythematous. The erythema subsided within 2 hours. Directly after the burning, the spots were treated by applying a thin layer of ointment to each as follows: *(a)* a widely advertised proprietary ointment containing zinc oxide, phenol, salycylates, and oils; *(b)* 10% scarlet red sulphonate in petrolatum; *(c)* 5% tannic acid and 5% ethyl aminobenzoate in petrolatum; *(d)* 1% butesin picrate (p-amino-benzoyl-butanol picrate); *(e)* 5% benzoyl peroxide and 5% ethyl aminobenzoate in petrolatum (this turns dark brown on standing); *(f)* 10% ethacaine (p-amino-benzoyl-ethanol benzoate) in petrolatum; *(g)* 5% benzoyl peroxide in petrolatum, and *(h)* petrolatum alone. Fresh applications were made daily for 10 days. The results of one such experiment may be summarized in part as follows:

Ointment	Duration of pain after ointment minutes	Size of Scar 3rd day after burn		Size of Scar 7th day after burn Diam. mm.	Size of Scar 12th day after burn Diam. mm.
		necrotic center Diam. mm.	hyperemic total Diam. mm.		
Proprietary zinc oxide	10	3	5	4 (no scab)	3.5 (no scab)
10% scarlet red	15	3	5	4 (no scab)	4.0 (no scab)
5% tannic acid with ethyl aminobenzoate	5	4	5	5 (scab)	4.5 (thin scab)
1% p-amino-benzoyl-butanol picrate	5	3	5	4 (punctate redness)	3.5 (punctate redness)
5% benzoyl peroxide with ethyl aminobenzoate	5	3	5	4 (thin scab)	3.5 (thin scab)
10% p-amino-benzoyl-ethanol benzoate	5	4	5	5 (thin scab)	4.0 (thin scab)
5% benzoyl peroxide	5	3	5	3 (thin scab)	3.0 (no scab)
Petrolatum	15	4	5	5 (thin scab)	5.0 (thin scab)

In another group of experiments a series of uniform skin burns were made by applying for 7 seconds at an initial temperature of 100°C. the tip of a steel rod 4 mm. in diameter. The same ointments were used and in the same way as above. Five days after the branding and beginning of the treatment, the scars in one of these experiments appeared as shown in Fig. 1. It may be noted in comparison with the others that in the burn treated with benzoyl peroxide the blister had subsided and the area of the scar had been reduced.

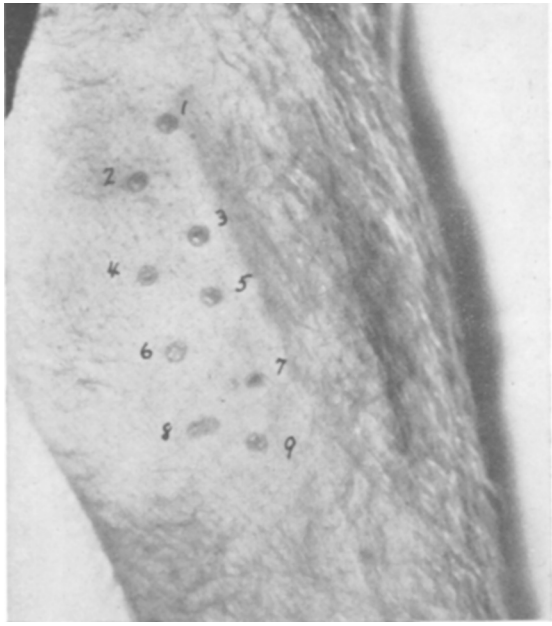

FIG. 1.
Skin lesions 5 days after applying for 7 seconds at an initial temperature of 100°C. the tip of a steel rod 4 mm. in diameter, and treating daily with (1) proprietary zinc oxide ointment, (2) 10% scarlet red sulphonate in petrolatum, (3) 5% tannic acid and ethyl aminobenzoate in petrolatum, (4) 1% p-amino-benzoyl-butanol picrate, (5) 5% benzoyl peroxide and ethyl aminobenzoate in petrolatum, (6) 10% p-amino-benzoyl-ethanol benzoate in petrolatum, (7) 5% benzoyl peroxide in petrolatum, (8) faulty burn, not uniform in size with rest, treated with 5% benzoyl peroxide in petrolatum, and (9) petrolatum.

The difficulty of judging from experiments such as these whether or not the healing process had been influenced by the various forms of treatment led us to begin a series of animal experiments in which we have attempted to use more satisfactory objective criteria, including the examination of histological specimens. These will be reported upon later.

While our experiments indicated the value of benzoyl peroxide ointments in promoting healing in certain types of skin injuries, clinical studies in connection with second degree burns failed to show their superiority to tannic acid dressings or to certain other ointments. However, it was found by Dr. H. Morrow and Dr. H. Miller in the Dermatology Clinic of the University of California Medical School, as well as by Dr. J. H. Woolsey in the Surgical Clinic, that a 10% benzoyl peroxide ointment in equal parts of petrolatum and lanolin is effective in clearing up chronic skin ulcers which have resisted treatment, in some cases for years.