ment (*1*, p. 13, sample No. 421) for the Tepexpan roots, 4,118 ± 300 years, indicates the date for the younger marl above the caliche, not for the bone-bearing layer itself. In other words, paleontologists and prehistorians need not infer from this radiocarbon date that mammoth and horse existed that late in the basin of Mexico; on the contrary, the absence of such fossil remains in formations of Recent geologic age in that area clearly indicates their extinction long before that time.

Considering further that bone and stone artifacts have been found by me and others in the Becerra formation near Tequixquiac, on the northwestern margin of the basin of Mexico (*2*, pp. 46–49), human antiquity can in the light of these new radiocarbon dates be accepted as proved. In this respect, the age measurement of 6,390 ± 300 years for charcoal taken from a preceramic culture-level at Tlatilco affords a significant glimpse into Mexican prehistory, for it establishes an age of early human occupation that antedates the first appearance of organized farming societies of the Archaic civilization by about 3,000 years.

In all these studies much valuable cooperation was given me by my Mexican colleagues, notably Daniel F. R. de la Borbolla, Alfonso Caso, Engineer Arellano, and Arturo Romano. A monograph on the basin of Mexico, as well as a travel book of mine, will soon be published.

References

1. ARNOLD, J. R., and LIBBY, W. F. *Radiocarbon Dates.* Chicago: Univ. of Chicago Inst. for Nuclear Studies (1950).
2. DE TERRA, H., ROMERO, J., and STEWART, T. D. *Tepexpan Man.* New York: Viking Fund Publ. in Anthropology, No. 11 (1949).

Lipase from Molds Grown on Oil Seeds

C. V. Ramakrishnan and B. N. Banerjee

Department of Biochemistry,
Indian Institute of Science, Bangalore

Camus (*1*), Garnier (*2*), and Wehmer (*3*) detected the presence of the enzyme lipase in molds like *Penicillium* and *Aspergillus* species. Ramakrishnan and Banerjee (*4*) found that the enzyme lipase obtained from the molds grown on oil seeds has a better activity than that obtained from the oil seeds.

In India, which stands second in the production of oil seeds, owing to improper storage and transport, millions of tons of oil seeds are spoiled every year because of mold growth. The authors have therefore undertaken a detailed study to analyze the different molds grown on different oil seeds, prepare the pure strains of the lipolytic molds from them, grow them in a synthetic medium, extract the lipase, and study its activity on various oils and fats.

In general the optimum pH for the lipases obtained from molds is 6.2. Disodium phosphate-citric acid is the best buffer, and ground-nut oil the best substrate.

Our preliminary survey has indicated that a cake medium is the best and cheapest for the production of lipolytic molds on a large scale. Work is under way to collect the strains of all the lipolytic molds, construct a pilot plant to grow them on a large scale, and extract lipase from them in a pure form.

Details of the results will be published elsewhere.

References

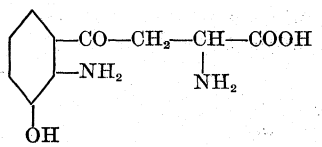
1. CAMUS. *Compt. rend. Soc. Biol.*, **49**, 192 (1897).
2. GARNIER, G. *Ibid.*, **55**, 1490, 1583 (1903).
3. WEHMER, C. *Lafer's Hand Book Tech. Mytiol.*, **4**, 239 (1907).
4. RAMAKRISHNAN, C. V., and BANERJEE, B. N. Univ. of Bombay: Ph.D. thesis (1949).

In Vivo Transformation of D,l-3-Hydroxykynurenine in Xanthurenic Acid

L. Musajo, F. M. Chiancone, and D. Coppini

Institute of Pharmaceutical Chemistry,
University of Modena,* and *Biological Laboratory
of "Lepetit S. A.," Milan, Italy

Musajo, Spada, and Casini (*1*) have recently accomplished the synthesis of D,l-3-hydroxykynurenine (small, citron-yellow crystals, mp 213° C, with decomposition):



This synthesis differs slightly from what appeared in a paper by Butenandt, Weidel, and Schlossberger (*2*) published shortly before the work of Musajo and collaborators; the German authors also mention the isolation of l-3-hydroxykynurenine from the fractionation of fresh chrysalids of *Calliphora erythrocefala.*

Musajo, Spada, and Casini have also shown (*1*) how 3-hydroxykynurenine can be transformed *in vitro* by heating with barium hydroxid in xanthurenic acid (4,8-dihydroxyquinoline-2-carboxylic acid) (*3*) and in 3-hydroxy-2-amino-acetophenone. From this transformation of 3-hydroxykynurenine we obtained about 30% by weight of xanthurenic acid.

Musajo and Chiancone determined in 1936 (*4*) that xanthurenic acid is formed *in vivo* from tryptophan through kynurenine. Later, in 1942, in the United States, Lepkovsky and Nielsen (*5*) brought to light the influence of vitamin B_6 on its formation.

Proceeding with our research on the genesis of xanthurenic acid, we treated rats with D,l-3-hydroxykynurenine and determined the xanthurenic acid eliminated with the urine. Parallel comparison experiments were also carried out with D,l-kynurenine. The animals were first held on a synthetic diet of casein, starch, fats, salts, and vitamins, and later gelatin was substituted for casein. From the urine of these animals, where xanthurenic acid was absent, after treating them

by mouth with D,l-3-hydroxykynurenine and D,l-kynurenine, we obtained results that can be summarized as follows:

1. The animals treated with a single dose of 50 mg of D,l-3-hydroxykynurenine eliminated with the urine in the following 48 hr 17–19.7% (calcd on the wt of 3-hydroxykynurenine employed) of xanthurenic acid.

2. The animals treated with 3 doses of 12.5 mg of 3-hydroxykynurenine (total, 37.5 mg in 24 hr) eliminated (in 48 hr) 20–28% of xanthurenic acid.

3. By administering 46.5 mg of D,l-kynurenine in a single dose (quantity corresponding to one of 3-hydroxykynurenine in the analogous experiments), an elimination of 2.5–4.2% (calcd on the wt of kynurenine) of xanthurenic acid was obtained.

4. With kynurenine divided into 3 doses of 11.6 mg each (total, 34.8 mg in 24 hr, quantity corresponding to one of the 3-hydroxykynurenine in the analogous experiments) an elimination of 9.1–11.2% of xanthurenic acid was obtained.

We therefore assume that xanthurenic acid is formed *in vivo* in the following manner:

Tryptophan→kynurenine→3-hydroxykynurenine→
→xanthurenic acid

The determinations of xanthurenic acid were made by a method which also takes into consideration the determination of the kynurenic acid studied by Musajo and Coppini.

References

1. MUSAJO, L., SPADA, A., and CASINI, E. *Gazz. chim. ital.*, **80**, 171 (1950).
2. BUTENANDT, WEIDEL, and SCHLOSSBERGER. *Z. Naturforsch.*, **4b**, 242 (1949).
3. MUSAJO, L. *Gazz. chim. ital.*, **67**, 166 (1937); MUSAJO, L., and MINCHILLI, *Ber.*, **71**, 1839 (1941).
4. MUSAJO, L., and CHIANCONE, F. M. *Gazz. chim. ital.*, **67**, 218 (1937).
5. LEPKOVSKY, S., and NIELSEN. *J. Biol. Chem.*, **144**, 135 (1942); LEPKOVSKY, S., ROBOZ, and HAAGEN-SMIT, A. J. *Idem.*, **149**, 195 (1943).

Depilatory Action of the Intermediary Polymers of Chloroprene[1]

Peter Flesch and Sheldon B. Goldstone[2]

Department of Dermatology, School of Medicine, University of Pennsylvania, Philadelphia

Temporary hair loss among workers engaged in the manufacture of neoprene rubber has been attributed to the inhalation of the volatile intermediary polymers of chloroprene, probably the cyclic dimers (*1, 2*). A single application of these compounds to the skin of animals produces complete local hair loss within 10 days, with disappearance of the follicles and sebaceous glands and excessive thickening of the epidermis. All these changes are reversible within 6 weeks.

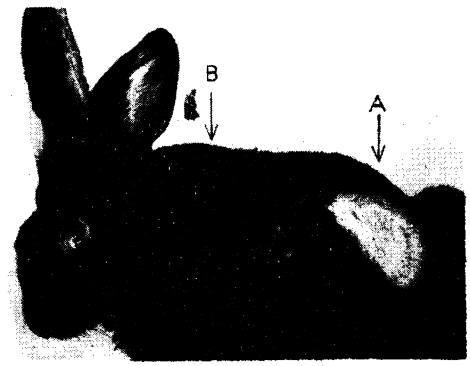


FIG. 1. *A*, hair loss in rabbit 10 days after application of a mixture of intermediary polymers of chloroprene; *B*, regrowth of hair in a patch treated 4 weeks earlier.

The depilatory agents were prepared as described by Ritter and Carter[3] (*1*). Local hair loss in rabbits, mice, and guinea pigs, and loss of feathers in chicks, were consistently obtained after a single application of 0.1–1 ml polymer mixture to the skin (Fig. 1). The localized temporary cessation of hair growth suggested interference with the normal process of keratinization, which involves the oxidation of – SH groups to – S – S – bridges. The intermediary polymers inactivated *in vitro* the free – SH groups of glutathione, human epidermis, and mouse liver homogenates, as determined by a previously described method (*3*). The concentrations necessary for this *in vitro* inactivation compared favorably with those required to induce baldness in animals. Inhibition of a sulfhydryl enzyme, succinic dehydrogenase (*4*), occurred with the same concentrations as inactivation of – SH groups (Fig. 2). The destruction of epidermal sulfhydryl groups was also demonstrated by histochemical methods (*5, 6*). This action of the chloroprene dimers differs from another reversible depilatory agent, thallium, which even in toxic concentrations has no effect on free – SH groups *in vitro* (*7*).

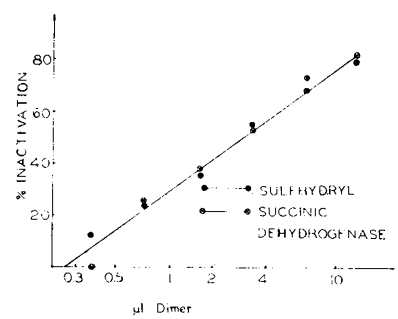


FIG. 2. Inhibition of free sulfhydryl groups and of succinic dehydrogenase activity in 10 mg mouse liver homogenate after 15 min incubation at room temperature with various concentrations of the depilatory agent.

[1] This work was done in part under a Damon Runyon Senior Clinical Fellowship of the American Cancer Society, Inc.

[2] We wish to acknowledge the helpful suggestions of Albert S. Carter, Jackson Laboratory, Du Pont Company, and of Wayne L. Ritter, Indianapolis, Ind.

[3] Chloroprene was obtained through the courtesy of E. I. du Pont de Nemours & Co.