trary to the case of the fatty acids) to find out what the meaning of the composite spacing is. Calculations show that it corresponds within the experimental error to the arithmetical average of all the components. It is probably justified in other cases to consider the spacing of the mixture also as average, provided the proper modification of the substance is considered.

Solid solution was also observed in the mixture of the normal paraffines C_{19}, C_{24}, C_{32} and C_{36}.

Since solid solutions of chain compounds may be obtained with such large relative changes in chain length it might be anticipated that the variation of the nature of end groups, provided the general shape of the molecules is the same, would not interfere with the solid solution formation. With this in view the approximately equimolar mixtures of the following substances were studied: (a) C_{18} acid, C_{18} acetate, C_{18} bromide and C_{19} hydrocarbon and (b) the ten normal fatty acids C_{10} to C_{19}; the six normal alcohols C_{13} to C_{18}; the two normal bromides C_{17} and C_{18}, the three normal acetates C_{16} to C_{18} and the four normal hydrocarbons C_{19}, C_{24}, C_{32} and C_{36}. In each case only one phase, with one definite crystal spacing in the direction of the chain axes (indicated to the fifth order), was obtained.

It appears to us, then, that it is safe to say that in general long chain compounds of quite a variation of length and type will form solid solutions. Also, it is possible, in spite of the complexity of such mixture, to observe average chain lengths in an appreciable number of orders. It appears, therefore, that it should be possible to obtain a similar effect in certain high polymers. In general, this has not been observed; however, there exists one piece of work dealing with this effect.[2]

In view of the results mentioned above, its reality can not be doubted any longer.

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MUCIFICATION OF THE VAGINAL EPITHELIUM OF IMMATURE MICE FOLLOWING INJECTIONS OF FOLLICULAR FLUID

HARRIS and Newman[1] proposed a test for the potency of extracts of corpora lutea based on the appearance of mucus-like cells in the vaginal epithelial of the adult mouse. Meyer and Allen[2] disputed the validity of this test because they were able to produce mucification in castrated rodents with dilutions of amniotin and theelin.[3] Both of these substances are commercial products standardized for the oestrogenic hormone. Harris[4] later pointed out that when "normal" instead of castrated mice were used he was unable to produce vaginal mucification. He concluded that "the injection of an oestrous preparation into otherwise normal mice does not bring on mucification of the vaginal epithelium."

In order to settle the point at issue, immature mice were injected with follicular fluid aspirated from the sow's ovaries. The sow's ovaries were obtained the day the animals were slaughtered, kept on ice and used the following day. Six injections of 0.2 cc each, given at six-hour intervals on two successive days, were administered to all the animals which lived over twelve hours.

The mean age of the first oestrus of the animals in this colony was 30 days, S.D.M. 0.5. All the experimental animals were killed at a mean age of 18 days, S.D.M. 0.5. Mirskaia and Wiesner[5] have shown that mucification may develop six days before the first oestrus. By killing the animals at an average of twelve days before the first oestrus, the mucification normally found prior to the first oestrous smear should have been avoided. The immaturity of the animals at death was also attested by the condition of the ovaries. In none of the ovaries of the seventeen animals examined were mature follicles or corpora lutea present.

Twenty animals in all were injected. They were killed twelve to seventy-two hours following the first injection. Sections were made of the vagina, uterus and ovaries. The vaginas from the four mice killed twelve hours after the first injection showed mucus like epithelial cells at the distal portion. The upper part of the vagina was closed. Five vaginas examined twelve hours later were found to be patent throughout. The epithelial border was wider than in the first group, the peripheral mucoid cells showed vacuolization. Two animals killed at thirty-six hours showed the mucoid vaginal cells higher and more vacuolated with cornified cells forming beneath. Three animals killed at forty-eight hours showed about the same picture as seen in the twenty-four

[2] Emil Ott, SCIENCE, 71: 465, 1930. *Z. f. phys. Chem., B, 9,* 378, 1930.

[1] Reginald G. Harris and Dorothy M. Newman, "A Practical Test for Potency of Extract of Corpora Lutea," SCIENCE, 74: 182, 1931.

[2] Roland K. Meyer and Willard M. Allen, "The Production of Mucification of the Vaginal Epithelium of Rodents by the Oestrus Hormone," SCIENCE, 75: 111, 1932.

[3] Theelin prepared by Parke, Davis and Company; amniotin prepared by E. R. Squibb and Sons.

[4] Reginald G. Harris, "Mucification of the Vaginal Epithelium of Mice as a Test for Pregnancy-Maintaining Potency of Extract of Corpora Lutea," SCIENCE, 76: 408, 1932.

[5] L. Mirskaia and B. P. Wiesner, "On the Occurrence and Mechanism of Prepuberal Mucification." Proc. Second International Congress for Sex Research, 408, 1931.

hour group, except that the cornified cells of the vagina had become more distinct. The periphery of the vagina was still lined by cells of the mucoid type. The four animals in the sixty-hour group all had cornified vaginal cells. In some instances, remnants of the mucoid cells could be seen clinging to the border, others were free in the lumen. Twelve hours later an examination of the vaginas of two mice showed a complete cornification, no trace of mucoid cells was seen, cornified cells were being shed and the borders becoming approximated.

The uteri of these animals showed progressive changes. At twelve hours a slit-like opening lined by cuboidal epithelial cells was present. At seventy-two hours the uteri showed widely distended lumina surrounded by elongated cells.

Follicular fluid from the sow's ovary may therefore cause mucification, for about 60 hours, of the vaginal epithelium in the normal immature mouse. This would invalidate the usefulness of a test depending upon the early appearance of mucus-like cells as an index of corpus luteum extract.

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STUDIES ON THE ETIOLOGY OF EGYPTIAN TRACHOMA

A BACTERIOLOGICAL investigation of trachoma, as it prevails in Egypt, was carried out in the Memorial Ophthalmic Laboratory at Giza (Cairo) from February to April, 1933. We are indebted to the officers of the Government Public Health Department and to Dr. R. P. Wilson, the director of the laboratory, as well as to the members of its staff, for their wholehearted cooperation.

The cases of trachoma studied conformed clinically to the disease as it occurs in America among Indian and white races. We obtained tarsectomized tissue—the tarsi having been removed for therapeutic purposes—from eleven patients having trachoma, chiefly of Types I, IIa and IIb of MacCallan's designations,[1] that is, types of the disease characterized mainly by follicular reaction. The tissue was cultivated following the mode of procedure originally devised by Noguchi.[2]

Bacterium granulosis was recovered from four of the eleven cases. The subconjunctival inoculation of cultures of the recovered microorganisms induced progressive granular conjunctivitis in four *Macacus sinicus* monkeys.[3] The general appearance of the experimental disease in these animals was identical with that observed by Noguchi, ourselves and others in monkeys inoculated with *Bacterium granulosis*[2,4] isolated from cases of trachoma occurring in the United States. On our return to New York we inoculated similarly five *Macacus rhesus* monkeys with the four pooled Cairo cultures. From six to eighteen days after the injection, four of the animals showed the characteristic granular conjunctivitis.

The Cairo strains agree in morphological, cultural and serological properties and in effects on animals with those obtained from patients suffering from trachoma and residing in other parts of the world.[5]

No evidence was obtained implicating as the incitant of the disease in Egypt any other microbic or ultramicroscopic agents. We failed to find in the cells of the trachomatous lesions inclusion bodies of the kind characteristic of many ultramicroscopic viruses. On the other hand, the Prowazek-Halberstaedter bodies, which appear to be composed of bacterial elements,[6] were observed in seventeen of forty-eight cases of trachoma studied in Egypt. In all instances in which these structures were detected the material examined had been derived from patients suffering from secondary bacterial infections, usually with Koch-Weeks' bacilli, superimposed on the trachomatous lesions.[7]

In view of our failure to detect in Egypt any other causal agent of trachoma and from the positive findings regarding *Bacterium granulosis,* the conclusions of Noguchi on the causal relation of the organism to the human disease have received additional support.[8]

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[1] A. F. MacCallan, "Trachoma and Its Complications in Egypt," pp. 1–74. London, Cambridge University Press, 1913.

[2] H. Noguchi, *Jour. Exp. Med.*, 48: Suppl. 2, pp. 1–53, 1928.

[3] All inoculations were made in ether-anesthetized animals.

[4] P. K. Olitsky, R. E. Knutti and J. R. Tyler, *Jour. Exp. Med.*, 54: 31, 1931; W. C. Finnoff and P. Thygeson, *Arch. Ophth.* (Chicago), 5: 527, 1931; C. Weiss, *Proc. Soc. Exp. Biol. and Med.*, 30: 908, 1933.

[5] F. Tallo, *Boll. Istit. Sieroterap. Milanese,* 11: 225, 1932; C. Weiss, *Arch. Institut Pasteur,* Tunis, 19: 433, 1930.

[6] See also A. W. Williams, *Jour. Inf. Dis.,* 14: 261, 1914; and I. A. Bengtson, *Am. Jour. Ophth.,* 12: 637, 1929.

[7] *Cf.* F. H. Stewart, Sixth. Ann. Rep. Giza Memorial Ophthalmic Laboratory, p. 107, Cairo, 1931.

[8] A full report of the investigations will be published in a forthcoming number of the *Archives of Ophthalmology.*

BOOKS RECEIVED

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