

The reduced acuity in individuals of greater body surface may be due to their possession of fewer sensory receptors per unit area. Further investigation is needed to establish this point.

Individuals of greater height and greater surface area appear to have a higher threshold of vibratory sensibility.

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### Propagation of Variola Virus in the Developing Egg.

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Since the early reports of Goodpasture and his coworkers<sup>1, 2, 3</sup> the chorio-allantoic membrane of the developing chick has been used for the propagation of a number of filterable viruses. This paper reports the propagation of the virus of variola major isolated directly from the pustular content of an active case. It is now in the forty-fifth consecutive passage on the chorio-allantoic membrane of the developing egg. The propagation of alastrim<sup>4</sup> has been attempted only after 2 passages through *Macacus rhesus* monkeys.

The patient, an unvaccinated white woman aged 32, developed a typical case of confluent smallpox shortly after a visit to Mexico City. The material for propagation was removed from lesions on the lower leg and soles of the feet on the seventeenth day after the onset of the disease. The abdominal and back lesions were starting to peel at this time. The material was obtained from 4 or 5 vesicles by means of a 1 cc. tuberculin syringe and consisted of 0.3 cc. of slightly turbid fluid and some swabs moistened with vesicle fluid. Growth was first obtained in one egg inoculated with 0.1 cc. of the vesicle fluid. Four days after inoculation, about 20 discrete yellowish white lesions were observed on the membrane. Impression smears showed typical Paschen bodies with Morosow's stain.<sup>5</sup>

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<sup>1</sup> Woodruff, A. M., and Goodpasture, E. W., *Am. J. Path.*, 1931, **7**, 209.

<sup>2</sup> Goodpasture, E. W., Woodruff, A. M., and Buddingh, G. J., *Science*, 1931, **74**, 371.

<sup>3</sup> Goodpasture, E. W., Woodruff, A. M., and Buddingh, G. J., *Am. J. Path.*, 1932, **8**, 271.

<sup>4</sup> Torres, C. M., and Teixeira, J. deC., *Compt. rend. Soc. de biol.*, 1935, **118**, 1023.

<sup>5</sup> Morosow, M. A., *Zentralbl. f. Bakt. Abt. 1*, 1926, **100**, 385.

The same findings were noted in the second egg, 5 days after inoculation with 0.1 cc. of a saline suspension of the swab material. The usual shell-flap method of Goodpasture was used throughout. Passage was made every 4 to 5 days by transferring a piece of membrane about 1 mm. in diameter, containing 2 or more lesions, to the exposed membrane of a 11-13 day egg. Six to 8 eggs were inoculated at each passage. No bacterial contaminations were encountered in 45 passages, and no dead embryos were observed.

A noteworthy point has been the inconstancy of the lesions produced in the membrane. Six eggs inoculated with the same material often produced several excellent membranes but absence of infection was by no means infrequent. Occasionally all inoculated eggs were negative and it was necessary to go back to membrane material stored in Petri dishes in the icebox. This inconstancy persists more than 6 months after the original isolation, and was likewise reported by Torres and Teixeira with alastrim.<sup>4</sup>

The character of the lesions depends on the severity of the infection on the membrane. If 10 to 50 discrete pocks appear, these reach a maximum size of about 1 mm. in about 72 hours; they are raised and rounded, and disappear within 2 or 3 days. When a heavier infection with crowding occurs, the pocks are about 0.5 mm. in diameter. They rapidly coalesce to form a yellowish raised area of necrotic tissue, flat on top and as large as 2 cm. in diameter. This plaque becomes dried and is cast off when the chick hatches. No embryo skin lesions have been noted, although some necrotic areas have been seen in the liver in heavily infected eggs. These pathological changes will be the subject of further study.

The recent work of Craigie and Wishart,<sup>6</sup> on the complement fixation reaction in variola provided a splendid means to confirm the presence of the virus. Membranes of the thirty-sixth passage, cut into small fragments, dried in the Mudd-Flosdorf apparatus, were forwarded to the Connaught Laboratories to be used as antigen. Dr. J. Craigie<sup>7</sup> kindly reported that variola membrane antigen gave complete fixation with an S serum but only partial fixation with an L serum, probably due to deterioration of the L antigen as a result of incomplete drying. The presence of the variola virus was further confirmed by staining impression preparations with Victoria Blue "Bayer", using the method of Herzberg.<sup>8</sup> Paschen granules were readily found in infected membranes, although not in such large numbers as in vaccinal membranes.

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<sup>6</sup> Craigie, J., and Wishart, F. O., *Can. Pub. Health J.*, 1936, **27**, 371.

<sup>7</sup> Personal communication.

<sup>8</sup> Herzberg, K., *Zentralbl. f. Bakt. Abt. 1*, 1936, **136**, 257.