of Ontario, who attended the Silicosis Conference in Johannesburg, South Africa, in the summer of 1930, and who informed me that Dr. Kettle in a paper read at the conference stated that by replacing the diluent in the egg medium by silicic acid he observed a lessening of the latent period of growth of the tubercle bacillus, but that the effect was merely temporary, the silicic acid having to be replaced at intervals. Since the proceedings have not yet reached me, I am unable to be sure of his actual findings.

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Factors Involved in Male Production by Crowded Moina macrocopa Mothers.

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The writers[1, 2, 3] have extended the earlier observations of Grosvenor and Smith[4] and others on the association between crowding of *Moina macrocopa* mothers and the production of male offspring. We also noted an association between retardation in the time of production of the parthenogenetic young and the percentage of male young produced. Within limits the percentage of male young produced is roughly proportional both to the degree of crowding and to the amount of retardation in the time of their production. Excessive retardation, however, whether induced by crowding or by other treatments, is accompanied by a reduced percentage of male young. We have interpreted this retardation and this male production as due to the accumulation of the mothers' excretory products.

Stuart and Banta[5] have shown that quantity of bacteria available as food for Moina mothers appears, under certain appropriate experimental set-ups, to be the determining factor in sex control in this species. This finding might raise the question as to whether quantity of available food is the principal or sole influential factor involved in male causation in crowding or other experiments, by

[1] Banta and Brown, *Sci. Papers, 2nd Int. Cong. Eugenics*, 1923, **1**, 142.

[2] Banta and Brown, *Physiol. Zool.*, 1929, **2**, 80, 93, 302, 309; 1930, **3**, 48.

[3] Banta and Brown, *Proc. Nat. Acad. Sci.*, 1929, **15**, 71.

[4] Grosvenor and Smith, *Quart. J. Mic. Sci.*, 1913, **48**, 511.

[5] Stuart and Banta, *Anat. Rec.*, 1929, **44**, 210; *Physiol. Zool.*, 1931, **4**, 72.

Moina mothers. In certain experiments[6] involving aeration of mothers during the critical period[3] male production was reduced or eliminated, in which case quantity of food apparently cannot be considered the determining factor in sex control. But the results of crowding might seem readily interpretable on this basis.

This note records the results of experiments designed to differentiate between (1) the quantity of available food and (2) some other factor associated with crowding (presumably "the accumulation of excretory products") as factors in influencing male production.

Into a series of bottles, each containing 25 cc. of manure solution culture medium, were placed young sister Moina—1, 2, 4, 6, and 8 females per bottle. Several such experiments were conducted. The results were fairly consistent. No males were produced in the 1-mother bottle; occasionally some appeared in the 2-mother bottles; a large percentage of males in the 4-mother bottles; still more in the 6-mother bottles; and a considerable percentage of males were produced in the 8-mother bottles, though a smaller percentage than in the 6-mother bottles.

With the aid of Miss Maurita McPherson, bacterial counts were made in some of these series—both at the time they were set up and at the critical period for sex determination. These counts showed, as was anticipated, that the numbers of bacteria at the time of the second count had decreased. This decrease was slight in the control (blank) bottle; more in the 1-mother bottle; still more in the 2-mother bottle; and, in general, the numbers of bacteria had decreased more and more as the numbers of mothers in the bottles were increased. But of most interest was that the percentages of males increased progressively up to the stage of over-crowding. The percentages of males did not follow, even roughly, the numbers of bacteria available as food for the experimental mothers during the critical period for the determination of the sex of their young. The numbers of bacteria in the one-mother bottles at the critical period ranged from 1.2 to 25.4 millions per cc. No males occurred in any of these 1-mother bottles. In the 6-mother bottles, in which the maximum male production occurred, the numbers of bacteria ranged from 1.0 to 14.6 millions per cc.

Since there is a close and fairly consistent relationship between the amount of crowding of mothers and their male production, but no consistent relationship between numbers of bacteria available as food for mothers and the sex of their offspring, some change which

[6] Banta and Brown, *Physiol. Zool.*, 1929, **2**, 93.

the Cladocera mothers made in the culture medium, other than mere reduction of the available quantity of bacteria, appears to have been the determining factor in influencing the sex of the young produced.

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Oral Immunization of Humans Against Pneumococcus, Determined by the Increased Protective Antibody Content of Serum.

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The writer reported[1] that protective antibodies against pneumococcus, type 1, could be found in the sera of rats fed either (1) infected pneumococcus tissue (2) the living organism, or (3) the acid killed organism. Not all sera of rats thus actively immunized were found to contain these transferable antibodies and in those that did, the amounts present neutralized from 10 to 100,000 fatal doses (in 0.20 cc.). Experiments performed on dogs demonstrated similar results. Neither agglutinins nor precipitins could be found in the blood of such orally immunized animals, a statement confirmed recently by Maeji[2] for a rabbit fed type 3 organisms. The absence of agglutinins and precipitins made it appear that a similar condition would possibly be found to exist in humans fed acid killed pneumococci, even if the subjects should be made actively immune by this procedure. Reliance would consequently have to be placed upon the detection of an increased concentration of protective antibodies as a means of determining immunity.

The experiments reported here were done between October, 1928, and October, 1930, and were briefly mentioned elsewhere.[3] The work was interrupted but is now being continued. The results obtained on 14 subjects are reported below.

The sedimented HCl killed organisms (type 1 throughout) were used directly after centrifugation or after desiccation and were administered generally on a fasting stomach. The quantities fed

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[1] Ross, Victor, PROC. SOC. EXP. BIOL. AND MED., 1926, **24**, 273.

[2] Maeji, Y., *Acta Scholae Univ. Imp.*, Kioto, 1929-30, **12**, 295.

[3] Ross, Victor, *J. Exp. Med.*, 1930, **51**, 585.