height, + 0.1; sternal notch height, + 0.2, and sitting height, + 0.4 per cent. Widths were not quite as fixed during this marked weight change as were lengths: shoulders (acromion) + 2.3; chest (transverse diameter) + 2.7; chest depth, + 4.2, and pelvic maximum diameter, + 0.5 per cent. The latter measure is remarkable constant with the individual.

Since adults show relatively large differences among themselves in the linear skeletal widths, and, these measures show themselves quite constant in the individual adult, even under marked and rapid weight change, it is evident, if further data confirms, that some skeletal widths should appear in the formula for predicting normal weight.

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The crystallization of starch.

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In the early stages of the malt diastase hydrolysis of starch, Lintner and Düll[1] obtained crystal clusters which gave the characteristic starch reaction with iodine, were insoluble in cold water but soluble in hot, and had a specific rotation of 196°. Beijerinck[2] dissolved starch paste by autoclaving and obtained microscopic needle clusters on cooling. These were birefringent when viewed between crossed nicols, but did not show the black cross which is so characteristic of starch grains. The writers' associate, Van de Sande Bakhuyzen,[3] found that aqueous solutions of starch, prepared by the method of the writers[4] without

[1] Lintner, C. J., and Düll, G., *Ber. d. Deutsch. Chem. Gesellsch.*, 1893, p. 2533.

[2] Beijerinck, M. W., *K. Akad. v. Wetenschapp. te Amsterdam*, Proc. Section of Sciences, xviii, 1, 305.

[3] Van de Sande Bakhuyzen, H. L., PROC. SOC. EXP. BIOL. AND MED., 1926, xxiii, 506.

[4] Alsberg, C. L., and Perry, E. E., PROC. SOC. EXP. BIOL. AND MED., 1924, xxii, 60.

the use of reagents or heat, give a precipitate with alcohol consisting of clusters of microscopic needles, which when viewed between crossed nicols are birefringent, without showing the black cross.

The writers repeated Beijerinck's experiments and verified his results. However, by autoclaving at a somewhat higher temperature, 150° to 160° C, and by the use of some other modifications of his method, they obtained clusters of larger needles, not merely from potato starch, but also from wheat, maize, canna and arrow-root starches. These crystals are but little soluble in cold water, more readily in hot. They give the iodine reaction.

Viewed between crossed nicols, the clusters are birefringent in all cases. In the case of wheat, maize, and arrow-root, the needles are very small. In the case of the potato and canna, they are relatively large—some of the clusters reaching a diameter over one-half that of the natural granules. The potato and canna clusters, moreover, show the black cross between crossed nicols about as plainly as the natural granules. In the canna clusters, the contrast between the black cross and the white of the cluster is not so sharp as in the potato clusters. The other starches are merely birefringent. It is believed that the absence of the black cross is due to the small size of the clusters, for in an occasional unusually large cluster (maize) indications of a cross could be seen though not plainly enough to be certain. Moreover, in occasional very small clusters in the potato and canna preparations the black cross was impossible to see. In the potato preparations the black cross consists of two perfectly straight crossing black bands, whereas in the natural starch grains the arms of the cross are more or less wedge-shaped, with the apex of the wedge at the center of the cross—the wedges, themselves, being more or less distorted in granules that are not spherical. The arms of the cross in the canna preparations seemed to be somewhat more wedge-shaped than in the potato preparation. When a crystal cluster which is oval in outline is observed while one of the nicols is being rotated slowly, no distortion or shifting of the arms of the cross is seen as the two nicols become parallel and the black cross disappears. With a selenite plate interposed, the addition and subtraction colors in the case of the large potato crystal clusters are of the same color, and apparently of the same intensity as in natural potato

starch grains. In the case of the canna clusters, which are composed of finer needles than the potato clusters, the colors were rather purplish and orange instead of blue and gold as in the natural granules.

The observations of the writers are apparently the first on record in which from clear solutions a crystalline precipitate has been obtained, which shows optical properties very similar to those shown by natural starch. While further investigation is required to determine whether or not this crystalline substance is identical with any substance in the natural starch grain, the fact that it behaves as does natural starch when viewed between crossed nicols renders it extremely probable that the "black cross" shown by the natural starch grain in polarized light is due to crystalline structure rather than to strain or lamination.

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Local immunization of guinea pigs to cutaneous infection with a pasteurella isolated from wild rats.

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In the course of the routine plague control work carried on by the U. S. Public Health Service under the direction of Dr. N. E. Wayson[1] a pasteurella infection of wild rats was encountered which seriously interfered with the rapid and accurate diagnosis of chronic rodent plague. As a rule guinea pigs cutaneously infected with the suspected tissues succumbed in 1 to 2 days to the pasteurella disease. In order to rule out mixed infections with *P. pestis* a number of special methods which will be published elsewhere were tried. It was apparent that an immunological procedure capable of protecting guinea pigs rapidly and completely against the pasteurella would probably allow the separation and

[1] Wayson, N. E., *Pub. Health Rep.*, 1925, lx, 1975.