

5714

The Isolation of Two Isomeric Inactive Cystines.

HUBERT S. LORING AND VINCENT DU VIGNEAUD.

From the Laboratory of Physiological Chemistry, University of Illinois, Urbana.

From a study of inactive cystine, obtained by the catalytic racemization by acetic anhydride of the acetyl derivative according to the method worked out by Bergmann and Zervas¹ for various other amino acids, evidence was obtained of the presence of 2 forms of cystine. With the experience gained in the separation of these 2 forms from this material by the fractionation of their hydrochlorides, the inactive cystine produced by the racemization of l-cystine by refluxing with concentrated acid was next investigated. Recently du Vigneaud and Hollander² demonstrated the presence of racemic cystine in this material by actual resolution with isolation of pure dextro cystine. The evidence, however, could not reveal whether or not meso cystine was present. By fractionation of the hydrochlorides we have now been able to actually isolate from this inactive cystine 2 modifications one of which, the less soluble is identical in crystalline form and behavior with racemic cystine formed by a mixture of equal amounts of pure dextro and levo cystine. The crystalline form and particularly the solubility of the hydrochlorides of the 2 isomers differ strikingly. The hydrochloride of the racemic modification is much less soluble and crystallizes in diamond-shaped crystals often with 2 opposite corners cut off, making actually a six-sided crystal yet retaining the distinct diamond-like form. The more soluble modification crystallizes in short blunt prismatic crystals. Furthermore we were able to obtain both free cystines in beautifully crystalline condition. The crystals of racemic cystine appeared to be thick elongated hexagons distinctly different from the typical hexagonal crystals of l- and d-cystine. The more soluble cystine crystallizes in thin parallelogram-like plates and in irregular 6-sided plates. There were also differences in the decomposition points between the hydrochlorides of both modifications as well as between the free cystines themselves.

The phenyl isocyanate derivatives were also prepared, the racemic form melting at 190-191°, the other at 184-185°. A mixture of the two melted at 181°.

¹ Bergmann, Max, and Zervas, L., *Biochem. Zeit.*, 1928, **203**, 280.

² du Vigneaud, V., and Hollander, L., *Proc. Soc. Exp. Biol. and Med.*, 1930, **28**, 46.

The formyl derivatives were prepared by a method of Professor Hans Clark,* unpublished as yet. The formyl racemic cystine melted at 190-192° and the formyl derivative of the more soluble form had a melting point of 178-180°. The formyl-l-cystine melts at 187-188°. These derivatives likewise showed different crystalline form and solubility. The formyl racemic cystine was resolvable by means of the brucine salt whereas under the same conditions the other isomeric inactive cystine did not yield to resolution.

The actual isolation of racemic cystine from the inactive cystine completes the proof of the presence of this modification in the material. From the evidence obtained we feel justified in tentatively assigning the meso structure to the more soluble isomer. We are subjecting it, however, to as rigorous a proof as possible. The investigation of these isomers and their derivatives is being continued as well as a study of their availability to the animal body in comparison with dextro and levo cystine.

5715

The Anterior Pituitary Sex Hormone of Normal and Semicastrated Rats.

F. E. EMERY, P. W. BASH AND W. R. LEWIS.

From the Department of Physiology, University of Buffalo.

It is well known that the anterior pituitary gland secretes hormones which are growth stimulators to the reproductive system. This can be easily demonstrated by grafting pituitary glands into sexually immature female rats. The enlarged ovaries produced in this way resemble in weight and histological appearance the hypertrophied ovary of semiovariectomized animals. The evidence presented by Engle and others, recently discussed,¹ shows that the anterior pituitary sex hormone is responsible for the hypertrophy of surviving ovaries and accelerated growth in the remaining testis of young animals.² Engle³ contends that the remaining ovary utilizes the anterior pituitary sex hormone previously used by both ovaries. This would give twice the amount of the hormone to the

* The authors wish to thank Professor Clark for so kindly making available to them his method for preparing formyl-l-cystine.

¹ Emery, F. E., *Anat. Rec.*, 1930, **47**, 300; *Physiol. Zool.*, 1931, **4**, 101.

² Lipschutz, A., *J. Physiol.*, 1922, **56**, 451.

³ Engle, E. T., *Anat. Rec.*, 1928, **37**, 275.