

ble up to at least 3 weeks. This delay in retrogression corresponds to the greater intensity of the changes produced by acid extract of anterior pituitary as compared with the changes produced by potassium iodide administration.

III. While all the doses of acid extract of anterior pituitary used by us produced marked hypertrophy, and while in some cases smaller doses could produce about as marked hypertrophy as the larger ones, in general, it was found that the hypertrophic changes caused by daily injection of 3 cc. of the extract were greater than those caused by daily injections of 1 cc. and  $\frac{1}{2}$  cc. of the extract. Thus, after a daily injection of  $\frac{1}{2}$  cc. of acid extract during a period of 6 days, marked hypertrophy of the thyroid was obtained. Instead of typical round or oval acini we found some slits in the center of the glands; in other acini peripheral vacuolization in the colloid was noticeable. Mitoses could be seen in increased number and the epithelium was high. Yet there was more colloid retained in the acini than after daily injection of 3 cc. extract over the same period of time, and some of the colloid was relatively hard and slightly retracted. However, even after daily administration of 3 cc. acid extract, the peripheral acini are still relatively wider and contain a larger amount of colloid than the central ones; but in these glands the colloid which is still present in the peripheral acini, is usually very soft, or it may disintegrate to small granules. While there is thus no direct correspondence between the amount of acid extract injected and the intensity of hypertrophy attained, on the average, larger doses of acid extract of anterior pituitary are more effective than smaller ones.

## 5234

### Cranial and Cranio-Tympanic Bone Transmission.

A. G. POHLMAN.

*From the St. Louis University School of Medicine.*

The perceptive mechanism of the internal ear may be said to occupy a position of reasonable physiological quiet so far as air sounds are concerned because the end organ is immersed in liquid and because of the depth to which the apparatus is buried away from the surface. The writer has shown elsewhere<sup>1</sup> that this acoustic insula-

---

<sup>1</sup> Pohlman, A. G., *Anat. Rec.*, 1930, **45**, 236.

tion amounts to about 30 sensation units or a factor of 1000 times the normal threshold intensity. This indicates the functional capacity of the sound transmission apparatus which may be likened to a matching transformer with the larger area at the low impedance end of the system (drum membrane) and the smaller area (stapes foot-plate) at the high impedance end.

If, however, the vibrations are transmitted directly to the cranial bones through the stem of a fork or with a bone telephone, then a somewhat different physiological condition obtains. The vibrations necessarily pass through all structures including the cochlea and the sound transmission system. The evidence indicates that the activating factor under these conditions is a direct transmission of the vibrations through the wall of the otic capsule (cranial transmission). This means that the vibrational thrusts through the air sound transmission apparatus do not contribute enough increased intensity to that already developed within the cochlea by direct transmission to come to consciousness. The result is that bone acuity is not influenced by the functional condition of the air sound transmission system proper. This point is of considerable diagnostic significance.

When the external auditory canal is occluded, or when the drum membrane has been loaded with liquid, the mechanical conditions for the transmission of both air and bone sounds are changed. The air acuity is more markedly lowered at the high frequency end and the normal individual presents a curve which is quite similar to a typical internal ear disability. The differences in the efficiency for the transmission of lower and higher frequencies is undoubtedly related to the weight of the occluding or loading factor because the larger the mass the relatively less well it responds to high frequencies. When the bone acuity is tested under the same conditions one finds the high frequency end of the audible field unaffected, while the low frequency end shows an enhanced acuity which is known as prolonged bone transmission by the otologists. The suggested explanation is that at the high frequency end the vibrations of the plug or liquid are too poorly developed to contribute to the intensity already registering in the cochlea but at the low frequency end the vibratory responses through the air sound transmission apparatus are sufficiently great to bring this route into prominence. The reason why no definite separation between this abnormal cranio-tympanic and the normal cranial bone transmission has been made is because of the limited range of the fork tests, and audiometric methods with a bone telephone were required to establish it. The abnormal cranio-

tympanic bone transmission occurs in any case with a functional air sound transmission system where the external auditory canal is occluded or where the drum membrane is loaded with liquid either on its lateral or on its deep surface. It does not take place when the air sound transmission apparatus is functionally out of commission or has been removed.

5235

### A Quantitative Test for the Determination of Xanthine and Hypoxanthine in the Blood.

WARREN H. COLE, WILLIAM H. ELLETT AND NATHAN A. WOMACK.

*From the Department of Surgery, Washington University School of Medicine and Barnes Hospital, St. Louis, Missouri.*

Working on the basis of the assumed fact that the enzyme, xanthine-oxidase, is specific for the conversion of xanthine and hypoxanthine to uric acid, we have devised a test for these 2 compounds in the blood. The enzyme is prepared from fresh milk after the method of Dixon and Thurlow.<sup>1</sup> A small amount of enzyme (50 mg.) is placed in a test tube containing 2 cc. of oxalated blood and incubated for 24 hours along with a control tube containing 2 cc. of oxalated blood from the same patient. After incubation for 24 hours at 37°C., a uric acid determination (Benedict Method) is made on the contents of each of the tubes. The difference in the amount of uric acid found in each of the tubes is presumably explained by the conversion of the xanthine and hypoxanthine of the blood by the xanthine-oxidase added to the blood in one of the tubes. We were surprised to learn that the increase in the amount of uric acid was quite routinely about 200% in the series of normal individuals upon which the test was performed. Up to date, however, no constant variation has been found in any of the group of diseases to which we applied the test. As far as we know the only other test available for the determination of xanthine and hypoxanthine in the blood is the nephelometric method devised by Graves and Kober in 1915.<sup>2</sup> They have apparently not applied their test to human blood, however.

---

<sup>1</sup> Dixon, M., and Thurlow, S., *Biochem. J.*, 1924, **19**, 971.

<sup>2</sup> Graves, S. S., and Kober, P. A., *J. Am. Chem. Soc.*, 1915, **37**, 2430.