inhibitors, further work on their role in developmental and neoplastic growth should prove fruitful.

THEODORE S. HAUSCHKA.

Lankenau Hospital Research Institute,
    Philadelphia, Pa.   Oct. 1.

[1] Medawar, P. B., Robinson, G. M., and Robinson, R., Nature, 151, 195 (1943).
[2] Kuhn, R., and Jerchel, D., Ber. Chem. Ges., 76 B, 413 (1943).
[3] Kuhn, R., Jerchel, D., Moewus, F., Moller, E. F., and Lettre, H., Naturwiss., 31, 468 (1943).
[4] Mendez, R., J. Pharmacol. and Exper. Therap., 81, 151 (1944).

Absolute Photopic Sensitivity of the Eye in the Ultra-violet and in the Visible Spectrum

In a paper published in 1941[1], measurements of photopic and scotopic sensitivity were given ; nine observers were used, after one hour adaptation to the dark, according to the method of colour appearance. These measurements were made in the range between the mercury lines 709 and 302 mμ. In this paper I am considering the question of absolute photopic sensitivity, as the inverse of the illumination of the retina $P_\lambda = 1/J_\lambda$.

The absolute photopic sensitivity, P_λ, in terms of number of (quanta/sec. sq. mm.)$^{-1}$ is related to the illumination of the pupil E_λ (the latter being expressed in erg./sec. sq. cm.) by the equation

$$P_\lambda = \left[\frac{E_\lambda \times 10^{-2}}{h\nu} \cdot (1-r) \cdot \frac{\sigma}{a} \right]^{-1},$$

where r represents the reflexion losses at the cornea (assumed to be 0·05), σ the area of the pupil (assumed to be 0·33 cm.^{2}) and a the area of the image on the retina. The area of the image a was 0·0083 mm.^{2}.

THE ILLUMINATION OF THE PUPIL, THE RETINAL ILLUMINATION AND THE ABSOLUTE PHOTOPIC SENSITIVITY OF THE NORMAL EYE IN THE ULTRA-VIOLET AND IN THE VISIBLE SPECTRUM (AVERAGE VALUES FOR 9 OBSERVERS).

$\lambda\,m\mu$	$E_\lambda \dfrac{\text{erg}}{\text{sec. cm.}^2}$	$P_\lambda \left(\dfrac{\text{quanta}}{\text{sec. mm.}^2}\right)^{-1}$	Log P_λ
302	$8·47 \times 10^{-1}$	$2·16 \times 10^{-13}$	$-12·7$
313	$8·86 \times 10^{-2}$	$1·87 \times 10^{-12}$	$-11·7$
334	$2·13 \times 10^{-2}$	$7·75 \times 10^{-12}$	$-11·1$
365	$6·69 \times 10^{-3}$	$2·25 \times 10^{-11}$	$-10·6$
390	$6·84 \times 10^{-4}$	$2·10 \times 10^{-10}$	$-9·7$
404–407	$1·36 \times 10^{-4}$	1×10^{-9}	$-9·0$
435	$1·88 \times 10^{-5}$	$6·71 \times 10^{-9}$	$-8·2$
491	$3·35 \times 10^{-6}$	$3·34 \times 10^{-8}$	$-7·5$
546	$1·34 \times 10^{-6}$	$7·52 \times 10^{-8}$	$-7·1$
576–579	$2·74 \times 10^{-6}$	$3·47 \times 10^{-8}$	$-7·5$
690–709	$4·91 \times 10^{-4}$	$1·60 \times 10^{-10}$	$-9·8$

The accompanying table shows the results of my measurements of photopic sensitivity. The curve of photopic sensitivity has its maximum at about 546 mμ. A more exact determination of the maximum does not appear to be obtainable, as the mercury spectrum has no corresponding lines. In my paper[1] it is stated : "the chromatic sensitivity decreases regularly with the decrease of the wavelength to 302 mμ". Speaking strictly, the photopic sensitivity curve in the 365–334 mμ region has a small but still visible flattening, after which it drops abruptly again.

The scotopic sensitivity in this region has its maximum (in the case of some observers) or a pronounced flattening of the curve (in other cases). Apparently some maximum of transmission in the lens occurs in the region of 365–334 mμ.

Measurements of the photopic sensitivity curve in the ultra-violet were made by C. F. Goodeve (unpublished). These measurements clearly show a marked flattening of the curve and a point of inflexion at about 350 mμ.

Our results as concerns the character of the curve in the ultra-violet thus confirm the work of Goodeve et al.[2].

N. I. PINEGIN.

State Optical Institute, U.S.S.R.

[1] Pinegin, N. I., C.R. Acad. Sci. URSS., 30, 3 (1941).
[2] Goodeve, C. F., Lythgoe, R. J., and Schneider, E. E., Proc. Roy. Soc., B, 130, 392 (1942).

New Light on the Mammalian Ear Ossicles

In spite of many criticisms, the Reichert-Gaupp theory of the mammalian ear ossicles[1,2,3,4] has, in its main points, been confirmed by a considerable body of work on the developmental anatomy of recent mammals and reptiles, and on the structure of therapsid reptiles. There can be little question that the stapes, incus and malleus (except for its dermal component, the goniale of Gaupp) are essentially homologous respectively with the reptilian columella auris (proximal part or otostapes), quadrate and articular. The existence of vestiges of other elements of the reptilian lower jaw and extrastapes in the mammalian middle ear has been suggested by numerous investigators. Thus the goniale is usually equated with the pre-articular[1,2,3,4, etc.], and the elements of Paauw and Spence have been regarded as parts of the extrastapes[5]. But in general there has been little agreement on the detailed homology of the parts of the stapes, of the crura of the incus, and of the various processes of the malleus ; this is largely because most of our information on these points is based on the anatomy of adult and embryonic stages of living mammals and reptiles, while mammals originated from the extinct therapsid reptiles, which differ from Lacertilia and Sphenodon in important respects. Until recently, too little was known in detail about the middle ear and lower jaw of therapsids, though Broom[6] showed the position of the tympanic membrane and the presence of an ossified portion of the extrastapes in some Therocephalia (see also ref. 7). E. C. Olson[8] has now provided, among other interesting things, an account of the structure of the otic region of several therapsids (Anomodontia, Therocephalia, Gorgonopsia, Cynodontia) based on serial sections. The structure of the middle ear region is greatly illuminated by this work ; but some of his conclusions seem to be open to question, while others can be further supported.

In all the forms discussed by Olson the stapes is perforate, and has a well-marked articulation with the quadrate (by a "processus internus" meeting a special extrastapedial process or lamina from the quadrate), and a strong process which is clearly the base of the distally cartilaginous extrastapes. A processus dorsalis and a separate hyoid process are not present in the fossils. The quadrate in all forms lies in a deep groove in the squamosal, but seems to have been attached to the squamosal and otic region by connective tissue and ligaments only. Valuable new details of the lower jaw are also provided by Olson's sections.

The stapes is exceedingly mammal-like in character : it might be added that a columelliform stapes is present in some therapsids as well as in the adults of some Marsupialia and the Monotremata. It seems highly probable that the stapedial muscle was inserted on the posterior part of the therapsid stapes, probably on the processus extrastapedialis. The