THE JOURNAL OF COMPARATIVE NEUROLOGY 317:219–232 (1992)

Visual Factors in Sound Localization in Mammals

RICKYE S. HEFFNER AND HENRY E. HEFFNER

ABSTRACT

The ability of mammals to localize sound varies widely among species. During the past

TABLE 1. Values of Parameters Examined as Predictors of Sound Localization Acuity in Mammals

	Sound localization	Delta t	Field of best	Visual acuity	Binocular	Trophic

However, the descriptions of cyclic activity patterns reveal

that few mammals are strictly nocturnal and that even fewer are strictly diurnal. Many species are active at dawn

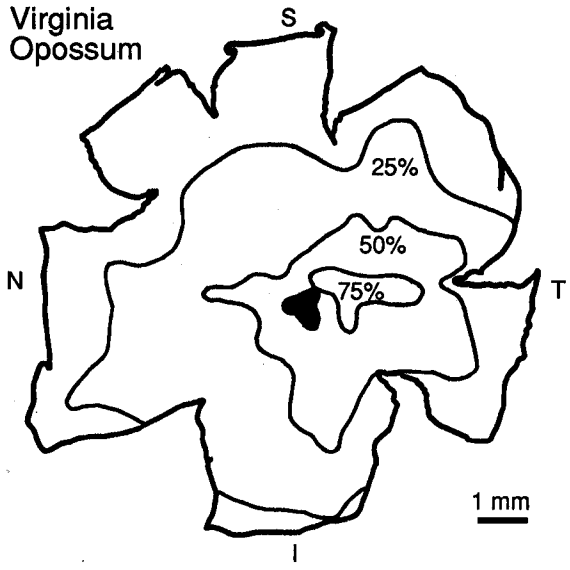
active throughout the day-night cycle, sleeping in short

sclera with a fine brush. The optic nerve was cut and the free-floating retina was slit to enable it to lie flat on a clean slide where the vitreous humor was carefully removed with

gelatinized slide, covered with a sheet of filter paper

that this nonlinearity is likely to vary with the size and shape of the lens and eye and is unknown for nearly all of

mined as the angle through which light from the narrow



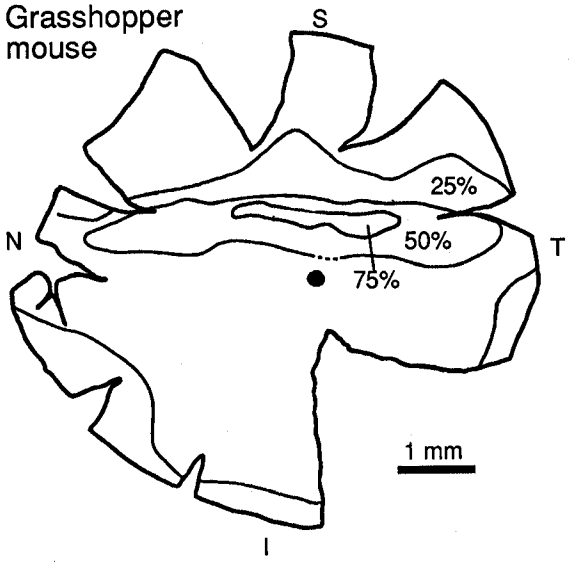
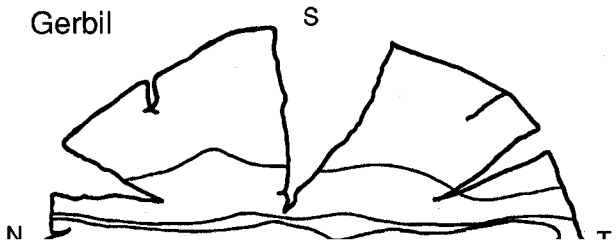


Fig. 1. Ganglion cell isodensity contours for a Virginia opossum. A small streak is evident in the 75% isodensity contour. The optic disk is indicated in black. S, superior; I, inferior; N, nasal; T, temporal.



ments of the head (although these were minimized by a behavioral procedure which required the animal to keep its mouth on a small waterspout). Accordingly, the threshold

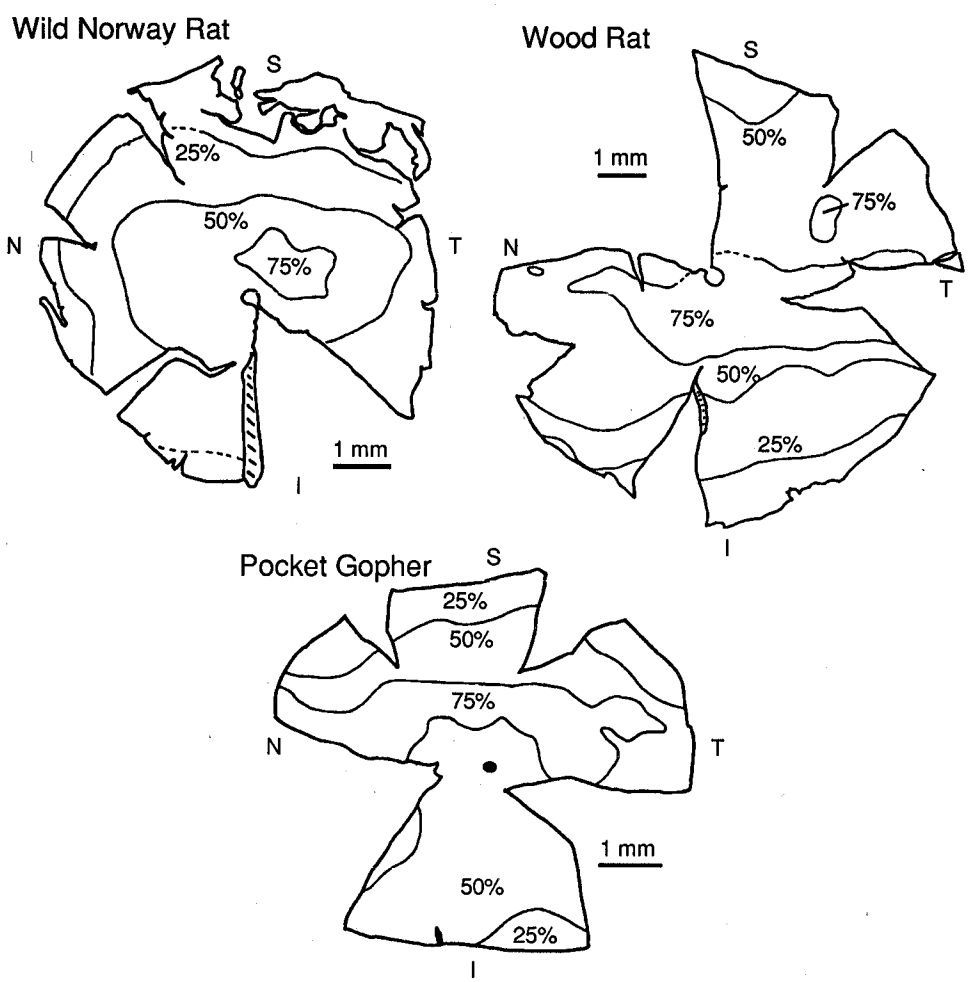
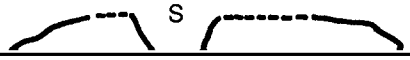


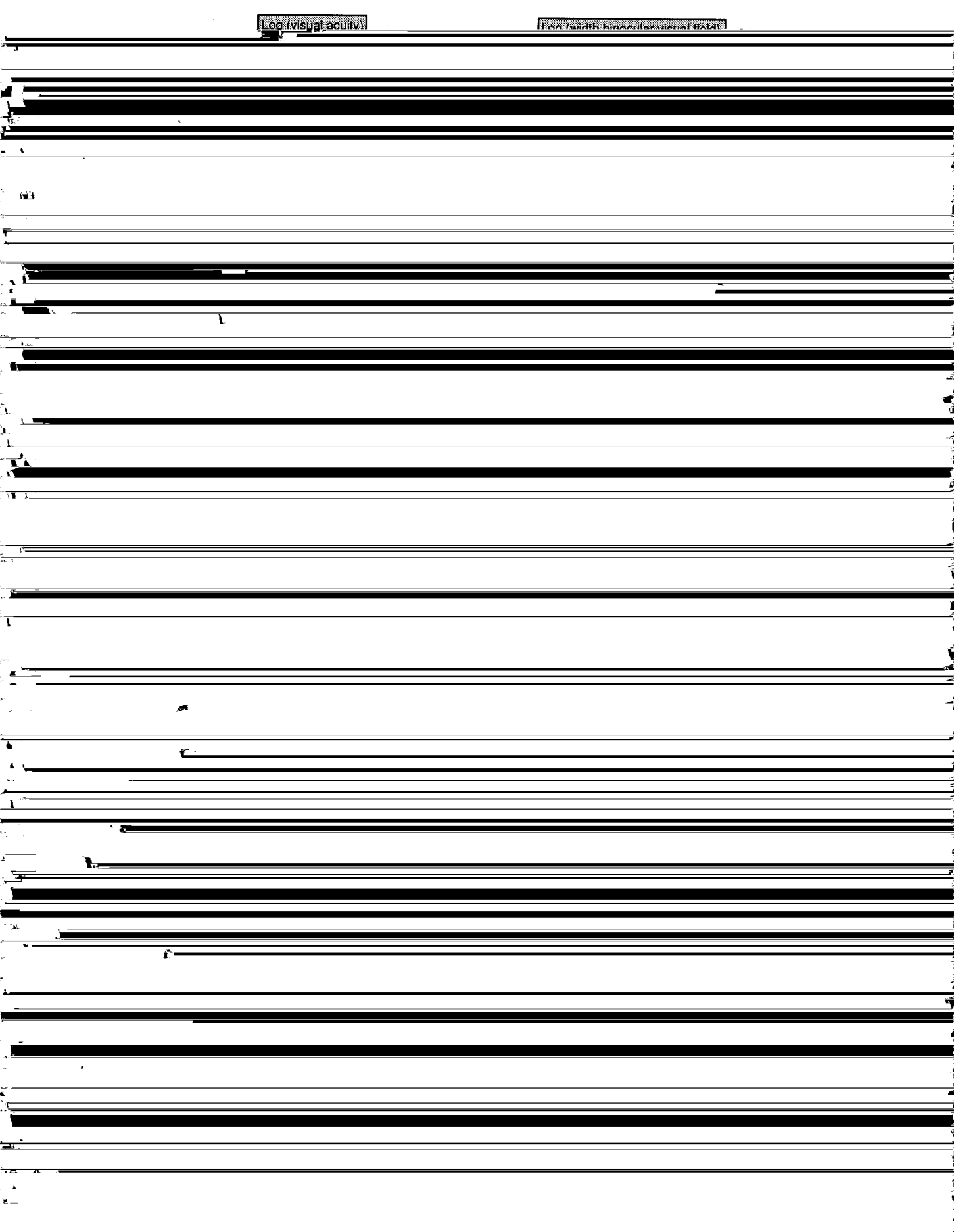
Fig. 3. Ganglion cell isodensity contours for a wild Norway rat [illegible] cat. Isodensity contours are approximately circular in the N

Artiodactyls. Retinal ganglion cell isodensity contours are illustrated for two Artiodactyls in Figure 4. The cow




Dog
S
Least Weasel

TABLE 2. First-Order Correlation Coefficients


Log (visual acuity)
Log (width binocular visual field)

First-order Correlations

Partial Correlations
Removing Effect of Field of Best Vision

100 Go* r = -.533

Go* r = .149, p > .6

which suggests that man's [illegible]

areas of best vision. Such broad areas of best vision would

Hafter, E.R., and J. DeMaio (1975) Difference thresholds for interaural delay. J. Acoust. Soc. Am. 57:181–187.

sound localization by the ferret (*Mustela putorius*) J. Neurophysiol. [illegible] localization in opossum ([illegible])

Kelly, J.B. (1980) Effects of auditory cortical lesions on sound localization by the rat. J. Neurophysiol. *44*:1161–1174.

Knudsen, E.I., and P.F. Knudsen (1989) Vision calibrates sound localization in developing barn owls. J. Neurosci. *9*:3306–3313.

Renaud, D.S., and A.N. Popper (1975) Sound localization by the bottlenose porpoise *Tursiops truncatus*. J. Exptl. Biol. *63*:569–585.

Rolls, E.T., and A. Cowey (1970) Topography of the retina and striate cortex and its relationship to visual acuity in rhesus monkeys and [illegible]