infested nest described above. Two young successfully fledged from the same nest in 1985, but there was no evidence of *H. inodorus*. However, another successful bald eagle nest had a concentration of 0.1 bugs/ sq. cm 2 wk after fledging. Concentrations of 0.2 bugs/sq. cm were found in two successful golden eagle nests within 1 wk after fledging.

Ectoparasites of the Eastern Chipmunk (*Tamias striatus*) from Tishomingo County, Mississippi

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There have been several studies on the ectoparasites of the eastern chipmunk but the majority of them were undertaken in the northern United States (Amin, 1973, J. Med. Entomol. 10: 110-111; Wilson, 1961, Ectoparasites of Indiana Mammals, Ph.D. Diss., Purdue Univ., Lafayette, Indiana, 548 pp.; Whitaker et al., 1979, J. Med. Entomol. 16: 350-351). Few studies have been undertaken in the southern United States except that of Durden (1983, J. Tenn. Acad. Sci. 58: 16-20) who monitored the epifauna of the eastern chipmunk in a suburban plot in central Tennessee.

Entomological surveys in general and especially those of mammalian ectoparasites are lacking from Mississippi. Chipmunks occur throughout much of central and southern Mississippi (Hall and Kelson, 1959, The Mammals of North America, Vol. I, Ronald Press, New York, 546 pp.), but some scattered populations can be found along the Tennessee River in the northern region. This paper presents information on the ectoparasites found on 31 chipmunks from Tishomingo County, Mississippi from spring 1982 to spring 1984.

An effort was made to collect five chipmunks per season (spring, summer, fall, winter) for 2 yr; however, despite repeated attempts, only one was collected in the

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winter of 1982-1983, and none was collected in the winter of 1983-1984.

Individual chipmunks were shot, placed immediately in a sealed plastic bag, and frozen until examination. Specimens were usually frozen within 30 min of collection. Upon examination, the hair and skin of the hosts were carefully inspected for larger ectoparasites. Then, individuals were scrubbed in a detergent solution which was subsequently filtered through a Buchner funnel. The plastic bags were rinsed in detergent solution and the solution also filtered. These filtrates were then examined with a 10-40 power dissecting microscope and ectoparasites were removed and placed in 70% ethanol. In addition, chipmunk tails were examined for tail follicle mites by squeezing the bases of the hairs. Ticks, fleas, lice, and botfly larvae were preserved in alcohol; mites were cleared and mounted in Hoyer's medium. Some mites and fleas were identified by the authors and the tail follicle mites were identified by B. O'Conner (University of Michigan). Other mite (partial), tick, lice, and botfly larvae identifications were provided by M. L. Goff (University of Hawaii at Manoa), J. E. Keirans (National Museum of Natural History), K. C. Emerson (Sanibel Island, Florida) and E. P. Catts (Washington State University) respectively. The following voucher specimens were deposited in the Mississippi Entomological Museum, Mis-

TABLE 1.   Ectoparasites of 31 eastern chipmunks from northern Mississippi.

Parasite	Total number parasites	Prevalence (%)	Intensity Mean	Intensity Range
Anoplura				
Hoplopleura erratica (Osborn)	124	36	11.3	1–49
Siphonaptera				
Orchopeas howardii (Baker)	2	7	1.0	1–1
Diptera				
Cuterebra sp.	3	7	1.5	1–2
Acarina				
Dermacentor variabilis (Say)	4	10	1.3	1–2
Dermacarus hylandi Fain	280	48	18.7	1–41
Chortoglyphus (=*Aplodontopus*) *sciuricola* Hyland and Fain	196	65	9.8	1–20
Androlaelaps fahrenholzi (Berlese)	20	36	1.8	1–3
Euschoengastia peromysci (Ewing)	15	3	15.0	1–15
Comatacarus americana (Ewing)	10	23	1.4	1–2
Parasecia sp.	4	7	2.0	1–3

sissippi State University, or the Bishop Museum, Honolulu, Hawaii: *Cuterebra* sp. (MEM#8-9); *Hoplopleura erratica* (MEM#8-10); *Orchopeas howardii* (MEM#8-11); *Chortoglyphus sciuricola* (MEM#8-12); *Dermacentor variabilis* (MEM#8-13); *Comatacarus americana* (MEM#8-14); *Euschoengastia peromysci* (MEM#8-15); *Parasecia* sp. (MEM#8-16); *Androlaelaps fahrenholzi* (MEM#8-17); and *Dermacarus hylandi* (Bishop #1982.484).

The ectoparasites recovered are summarized in Table 1. *Dermacarus hylandi* Fain was the most commonly encountered arthropod; this finding is consistent with that of Whitaker et al. in Indiana (1979, op. cit.); however, *D. hylandi* hypopodes are phoretic and not true ectoparasites. *Orchopeas howardii* (Baker) was not collected from *T. striatus* by Whitaker et al. in Indiana or by Durden in Tennessee (Whitaker et al., 1979, op. cit.; Durden, 1983, op. cit.), but has been reported previously from the chipmunk (Amin, 1973, op. cit.). Data from this study and those cited previously suggest that *O. howardii* is only an accidental parasite of the eastern chipmunk.

Our study is in partial agreement with the one in Tennessee (Durden, 1983, op. cit.) with significant differences in the species of mites collected. Although we both reported *Dermacarus hylandi*, Durden reported *Androlaelaps casalis*. We found *A. fahrenholzi*. Durden reported *Haemogamasus* sp., *Eulaelaps* sp. and *Eutrombicula* sp.; we found *Comatacarus americana* (Ewing), *Euschoengastia peromysci* (Ewing), and *Parasecia* sp.

Sixty-five percent of the chipmunks examined contained the tail follicle mite *Chortoglyphus* (*Aplodontopus*) *sciuricola*. Durden (1983, op. cit.) reported 33.3% of chipmunks infested and Whitaker et al. (1979, op. cit.) found *C. sciuricola*, but only a few chipmunks were specifically examined for the mite in that study.

Intensities of ectoparasites were highest in the spring and lowest in the summer which is consistent with other studies (e.g., Ellis, 1955, Ecology 36: 12–18). Unfortunately, adults of the *Cuterebra* sp. were not reared and the species could not be identified from the larval stage; however, the collection dates suggest they might be *Cuterebra fontinella* and not *Cuterebra emasculator*. Three third instar botfly lar-

vae were removed from two chipmunks in the first week of July. In Mississippi, myiasis by *C. emasculator* occurs between 14 August and 29 October with a peak in the second week of September (Jacobson et al., 1981, J. Wildl. Dis. 17: 79–87).

There were only four larvae of *D. variabilis* found on 31 chipmunks even though adult *D. variabilis* activity in the study area was high as indicated by tick drag cloth collections (Goddard et al., unpubl. data). The chipmunk does not appear to be a principal host of larvae of *D. variabilis* in this area.

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The Growth Rate of Hooves of White-tailed Deer

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The ability to date outbreaks of diseases retrospectively is certainly of research and managerial importance. Periodic outbreaks of hemorrhagic diseases (HD) caused by bluetongue and epizootic hemorrhagic disease viruses have caused extensive mortality among white-tailed deer (*Odocoileus virginianus*) in the southeastern United States (Prestwood et al., 1974, J. Wildl. Dis. 10: 217–224). Gross pathological manifestations of chronic HD include damage to the coronary bands which often results in sloughing hooves (Thomas, 1981, Hemorrhagic disease, *In* Diseases and Parasites of White-tailed Deer, Davidson et al. (eds.), Tall Timbers Res. Sta., Tallahassee, Florida, pp. 87–96). Distance of hoof growth that occurred after healing of the coronary bands should provide an estimate of the time that has elapsed following the disease outbreak.

Herein, we report on the results of a preliminary study to determine (1) the rate of growth of white-tailed deer hooves and (2) seasonal variations in growth rate.

From May 1983 through May 1984, we measured the rate of hoof growth of 10 male white-tailed deer maintained as part of a research herd by the University of Georgia School of Forest Resources. Deer

were captured at 2-mo intervals. A notch was filed on the dorsal surface of each digit 10 mm from the proximal border of the coronary corium. The distance that the notch had progressed was measured on each succeeding capture date and the hooves were renotched. These distances were averaged for all eight digits of each animal to provide a mean growth rate/deer.

Although the small sample sizes of yearling bucks precluded statistical analyses, our data suggest that their hooves grew faster, ranging from 1.1 (December–February) to 1.4 (February–May) times that of the adult bucks (Table 1). On a yearly basis, the yearling's hooves grew at a rate of approximately 6.6 cm/yr, while those of older bucks averaged 5.3 cm/yr. Hoof lengths of the yearling bucks increased an average of only 0.2 cm over the course of this study which reflects increased body size. Hoof lengths of adults did not increase. Thus, the yearling's hooves were apparently abraded faster than those of the adults. Several proximate causes for this may be proposed. McCullough (1965, J. Wildl. Manage. 29: 210–212) reported the hoof width of yearling black-tailed bucks (*O. hemionus*) to be significantly less than that of adults. White-tailed yearlings similarly exhibit narrower hooves (Marchinton, unpubl. data). Therefore, the