

**The Distribution of the Smoky Shrew, *Sorex fumeus*,
and the Pygmy Shrew, *Microsorex hoyi*, in Indiana
with Notes on the Distribution of Other Shrews**

WYNN W. CUDMORE AND JOHN O. WHITAKER, JR.
Department of Life Sciences, Indiana State University
Terre Haute, Indiana 47809

Introduction

The presence of the Smoky Shrew, *Sorex fumeus*, and the Pygmy Shrew, *Microsorex hoyi*, in Indiana was first documented by Caldwell, Smith and Whitaker (1982). The presence in Indiana of these species was suspected based on the continuous nature of the physiographic ecological region from northern Kentucky to southern Indiana. *Microsorex* occurs from Alaska through Canada and into the United States as far south as Colorado and Georgia (Diersing 1980). *Sorex fumeus* occurs from southeastern Canada through the northeastern United States to the mountains of Georgia and west across two-thirds of Kentucky (Hall 1981, Caldwell and Bryan 1982). The ranges of the two species overlap extensively in the eastern United States.

The present study was undertaken to establish the distribution of *S. fumeus* and *M. hoyi* in Indiana and to gain additional information on the distribution of associated shrew species.

Methods and Materials

A total of 35 localities in 21 southern Indiana counties was trapped to indicate the presence or absence of *S. fumeus* and *M. hoyi*. Pitfall traps (1000 ml plastic disposable beakers with approximately one inch of water) were sunk along natural obstructions (i.e., logs, rock faces, etc.) in suitable habitat. An average of 19 cans (range 6-40) was used per site, left in place an average of 31 days (range 16-49) and checked periodically. Trapping effort totalled 29,967 trapnights. Specimens were prepared as study skins and skulls or as skulls only depending on their condition and were deposited in the Indiana State University Mammal Collection.

Results and Discussion

Total numbers of captures for each species were: 299 Short-tailed Shrews (*Blarina brevicauda*), 108 Smoky Shrews (*S. fumeus*), 98 Masked Shrews (*S. cinereus*), 73 Pygmy Shrews (*M. hoyi*), 76 Southeastern Shrews (*S. longirostris*), 69 Pine Voles (*Microtus pinetorum*) and 32 White-footed Mice (*Peromyscus leucopus*). The locations of 13 sites where *S. fumeus* was taken are indicated in Figure 1. Smoky Shrews occurred as far west as the Martin State Forest, Martin Co., as far east as the Clark State Forest, Clark Co. and as far north as the Morgan Monroe State Forest in Monroe Co. *Microsorex hoyi* occurred on 17 sites and occupied a similar but slightly greater range than *S. fumeus* (Figure 2). Western-most sites included the Ferdinand State Forest in Dubois Co. and a site 6 mi W of Spencer, Owen Co. while northern and eastern boundaries were the same as those for *S. fumeus*. The two species occurred together on eight sites, *M. hoyi* occurred alone on nine sites and *S. fumeus* occurred alone on five sites.



FIGURE 1. Sites where *Smoky Shrews*, *Sorex fumeus* have been taken in Indiana (Solid circles). Hollow circles indicate that trapping occurred during this study, but no *Smoky Shrews* were taken.



FIGURE 2. Sites where *Pygmy Shrews*, *Microsorex hoyi* have been taken in Indiana (Solid circles). Hollow circles indicate that trapping occurred during this study, but no *Pygmy Shrews* were taken.

Both *S. fumeus* and *M. hoyi* are restricted primarily to the unglaciated region of Indiana. The Illinoian advance of Pleistocene glaciation extended as far south as indicated in Figs. 1 and 2 (Wayne and Zumberge 1965) and few sites lie outside this boundary. Of 22 sites that harbored either Smoky Shrews or Pygmy Shrews, 17 occurred within the Illinoian glacial boundary. Four of those sites that occur on glaciated areas are very close to the boundary (6 mi W of Columbus, Bartholomew Co.; Clark State Forest, Clark Co.; 2 mi N of Whitehall, Owen Co.; Jackson-Washington State Forest, Jackson Co.). An Owen Co. site 6 mi W of Spencer represents the location farthest from the glacial boundary. *Microsorex hoyi* alone was taken on three of the five sites outside the glacial boundary while both *M. hoyi* and *S. fumeus* were taken on the other two.

The slightly more extensive range of *M. hoyi* would be expected based on the known habitat tolerances of the two species. *Sorex fumeus* is restricted to shady, damp coniferous or hardwood forests and is seldom found in dry woods (Hamilton and Whitaker 1979). *Microsorex hoyi* is known to occur in a variety of habitats including bluegrass pasture, mature woodland, marsh, brushland, riparian woodland, bogs and rich mesophytic forests (Buckner 1966, Long 1972, Caldwell and Bryan 1982).

Habitat preferences for *S. fumeus* and *M. hoyi* in Indiana may be generally described as mature woods in moist ravines or on wooded slopes with many downed logs and a deep humus layer. Sugar maple (*Acer saccharum*) dominated most sites where *S. fumeus* occurred. Sandstone or limestone outcrops were present on several sites and Christmas fern (*Polystichum acrostichoides*) was a common associate. Dominants on sites where *M. hoyi* was taken were somewhat more variable. In addition to those sites occupied by *S. fumeus*, habitats including dominants of American beech (*Fagus grandifolia*), Red oak (*Quercus rubra*), Chestnut oak (*Q. prinus*) and hickories (*Carya* spp.) harbored Pygmy Shrews. Further trapping in other habitats within the unglaciated region may indicate that Pygmy Shrews occupy other habitats as well. Soil moistures varied from moist to dry for *M. hoyi* but no *S. fumeus* were taken on dry sites. On sites where *M. hoyi* co-occurred with *S. longirostris*, Pygmy Shrews occupied upper elevation often sloping habitats while Southeastern Shrews occurred on lower elevation or more bottomland habitats along creeks.

Two other shrews, the Short-tailed Shrew (*Blarina brevicauda*) and the Southeastern Shrew (*S. longirostris*) were commonly associated with *S. fumeus* and *M. hoyi*. *Blarina* occurred on all but five sites and was the dominant small mammal on 14 sites. *Sorex longirostris* occurred on 18 sites throughout the unglaciated region and to the west (Fig. 3). *Sorex cinereus* occurred on three sites (Figure 3). Two of these sites in the eastern part of the state (Jennings Co. and Ohio Co.) yielded only Masked Shrews while both *S. cinereus* and *S. longirostris* occurred on a site at Freeman, Owen Co. French (1980) reported that the two species are usually mutually exclusive, being trapped together on only three previous occasions in Indiana. Where they co-occur in Vigo Co., the two species occupy distinct habitats, *S. cinereus* in the glacial floodplain of the Wabash River and *S. longirostris* in the surrounding uplands. Indications from the present study are that a similar situation on a larger geographic scale may explain the occurrence of *S. longirostris* in unglaciated upland sites and *S. cinereus* on glaciated lowland sites. Mumford and Whitaker (1982) state that *S. longirostris* probably occupies much of the southern two-thirds of Indiana while *S. cinereus* is especially common in the northern half of the state although it does occur as far south as Posey and Spencer Counties (Figure 3). It is apparently absent in the south central unglaciated portion of the state, the area in which *S. fumeus* and *M. hoyi* occur.

Studies are now being completed on the food habits, ectoparasites and interrelationships of these species and will be considered in a future paper.

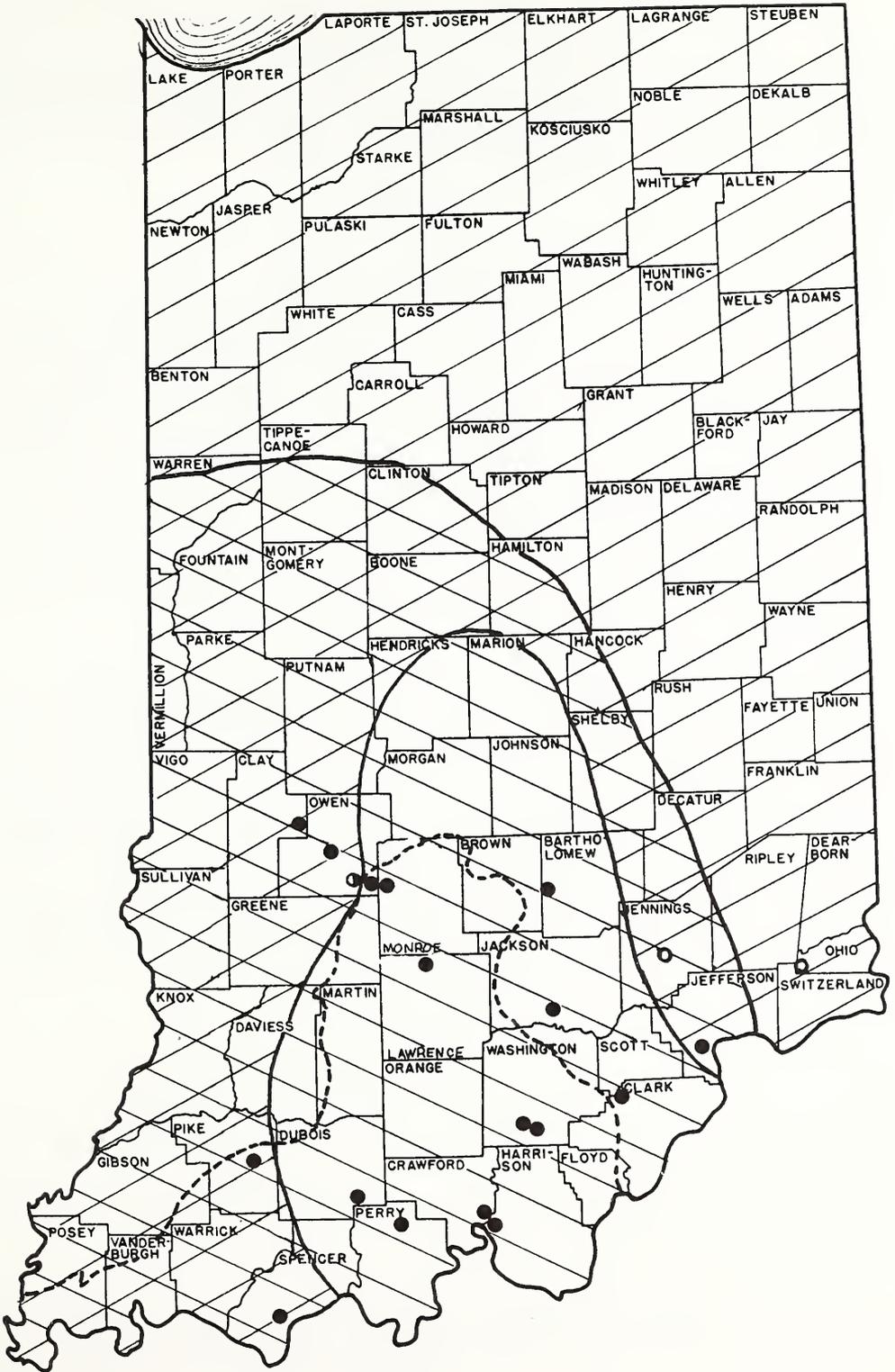


FIGURE 3. Ranges of Southeastern shrew, *Sorex longirostris* (cross-hatching slanted down to the right), and Masked shrew, *S. cinereus* (slanted down to the left). Solid circles indicate capture sites for *S. longirostris*, hollow circles indicate capture sites for *S. cinereus* and half-shaded circle indicates captures of both species.

Acknowledgments

We thank William H. Kern and Barbara A. Brown of Indiana State University and Larry Alsop and Rick Percy of Crossley Fish and Wildlife Area for their generous help with the field work, and Christine Marks for making the figures.

Literature Cited

1. Buckner, C.H. 1966. Populations and ecological relationships of shrews in tamarack bogs in southeastern Manitoba. *J. Mammal.* 47:181-194.
2. Caldwell, R.S. and H. Bryan. 1982. Notes on distribution and habitats of *Sorex* and *Microsorex* (Insectivora: Soricidae) in Kentucky. *Brimleyana* 8:91-100.
3. Caldwell, R.S., C.K. Smith and J.O. Whitaker, Jr. 1982. First records of the smoky shrew, *Sorex fumeus*, and pygmy shrew, *Microsorex hoyi*, from Indiana. *Proc. Ind. Acad. Sci.* 91:606-608.
4. Diersing, V.E. 1980. Systematics and evolution of the pygmy shrews (subgenus *Microsorex*) of North America. *J. Mammal.* 61:76-101.
5. French, T.W. 1980. Ecological relationships between the southeastern shrew (*Sorex longirostris* Bachman) and the masked shrew (*S. cinereus* Kerr) in Vigo County, Indiana. Ph.D. Dissertation. Indiana State University, Terre Haute, Indiana. 54 pp.
6. Hall, E.R. 1981. The mammals of North America. 2nd ed. Vol. 1. John Wiley and Sons, New York. 600 pp.
7. Hamilton, W.J., Jr. and J.O. Whitaker, Jr. 1979. Mammals of the eastern United States. Cornell University Press, Ithaca, N.Y. 346 pp.
8. Long, C.A. 1972. Notes on the habitat preference and reproduction in pigmy shrews, *Microsorex*. *Canadian Field Nat.* 86:155-160.
9. Mumford, R.E. and J.O. Whitaker, Jr. 1982. Mammals of Indiana. Indiana University Press. Bloomington, Indiana. 537 pp.
10. Wayne, W.J. and J.H. Zumberge. 1965. Pleistocene geology of Indiana and Michigan. pp. 63-83 in Wright, H.E., Jr. and D.G. Frey (eds.). 1965. The Quaternary of the United States. Princeton University Press, Princeton, N.J. 922 pp.