

II. BIOLOGY OF PEST MOLE CRICKETS

Systematics and Life Cycles (T. J. Walker)

Species and their identification

Four species of mole crickets occur in Florida (Fig. 1). The northern mole cricket, *Neocurtilla hexadactyla*, is a native species of no economic importance. It is recognized by its *four* tibial dactyls (Fig. 3b). The other three species are pests, have *two* tibial dactyls, and belong to the genus *Scapteriscus* (Fig. 3c–e).

The tawny mole cricket, *S. vicinus*, has the tibial dactyls nearly touching at their bases (Fig. 3c). The southern mole cricket, *S. acletus*, and the short-winged mole cricket, *S. abbreviatus*, have a distinct gap between the tibial dactyls, and in the latter species the dactyls are slightly divergent (Fig. 3d, e). Other means of distinguishing the species of *Scapteriscus* are the length of the trochantal blade (Fig. 4a–d), the dorsal pronotal pattern (Fig. 5a–d), and the mottling of the hind legs (characteristic of the short-winged mole cricket). Only in the short-winged mole cricket are the adult wings shorter than the pronotum. (Large juveniles of other mole crickets also have short wings, but the right and left ones do not overlap.)

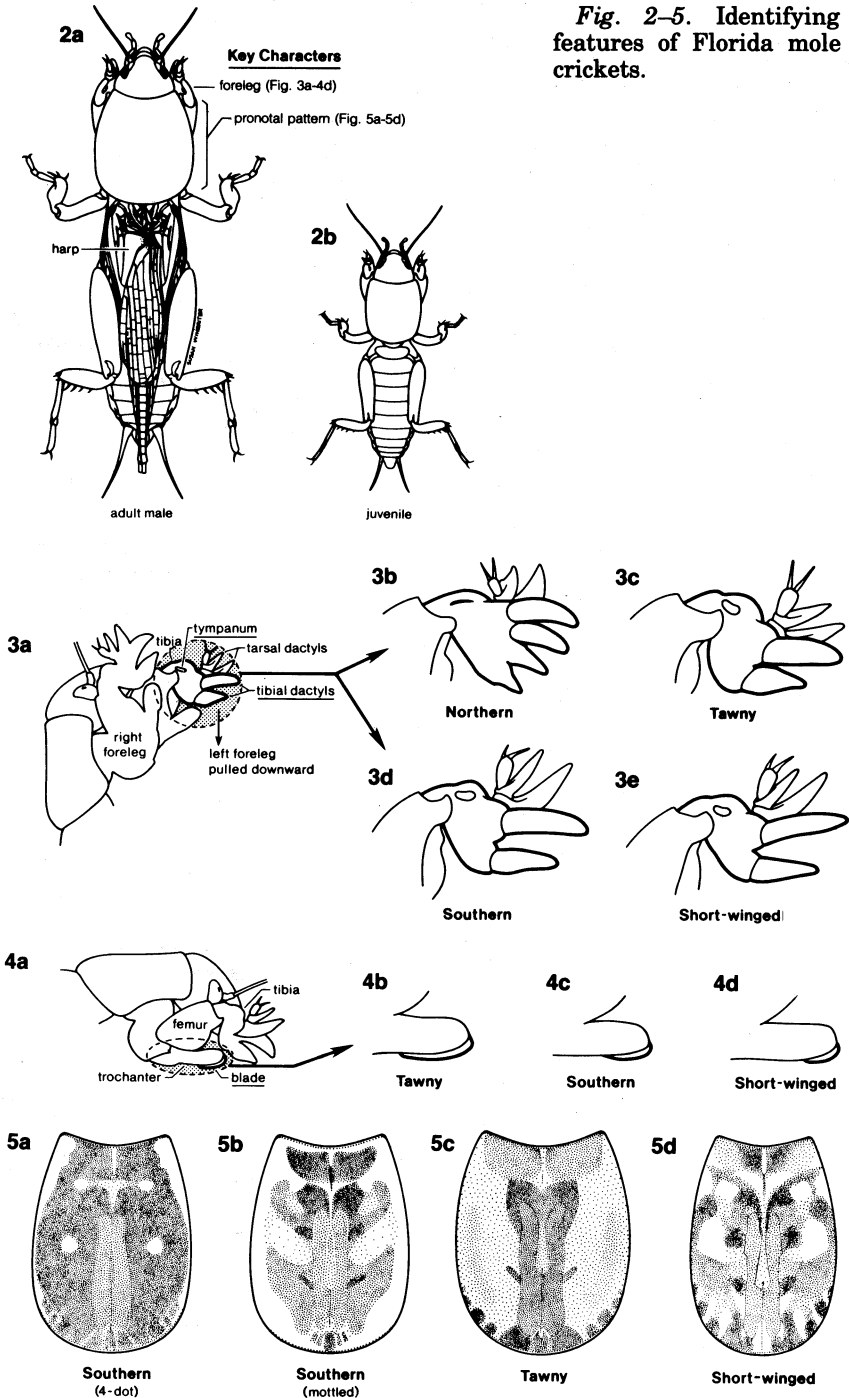
Geography

Florida's three pest mole crickets were inadvertently introduced to the southeastern United States from South America about 1900. It seems likely that they traveled in ship's ballast that was dumped in preparation for taking on heavy loads of timber or naval stores. The short-winged mole cricket was first collected at Tampa and was shortly thereafter taken in the vicinity of three other, widely separated ports. It has spread slowly and is largely restricted to coastal areas (Fig. 8).

The tawny mole cricket was first recorded at Brunswick, Georgia, a major seaport at the time. It gradually spread, reaching southernmost and westernmost Florida around 1960. The species is continuing to move westward along the Gulf (Fig. 7).

The southern mole cricket was introduced at no fewer than four ports: Brunswick, in 1904; Charleston, in 1915; Mobile, in 1919; and Port Arthur, Texas, in 1925 (Fig. 6b). The crickets introduced at Brunswick and Mobile had mottled pronotums (Fig. 5b); those introduced at the other two ports had dark pronotums with four pale spots

Fig. 2-5. Identifying features of Florida mole crickets.



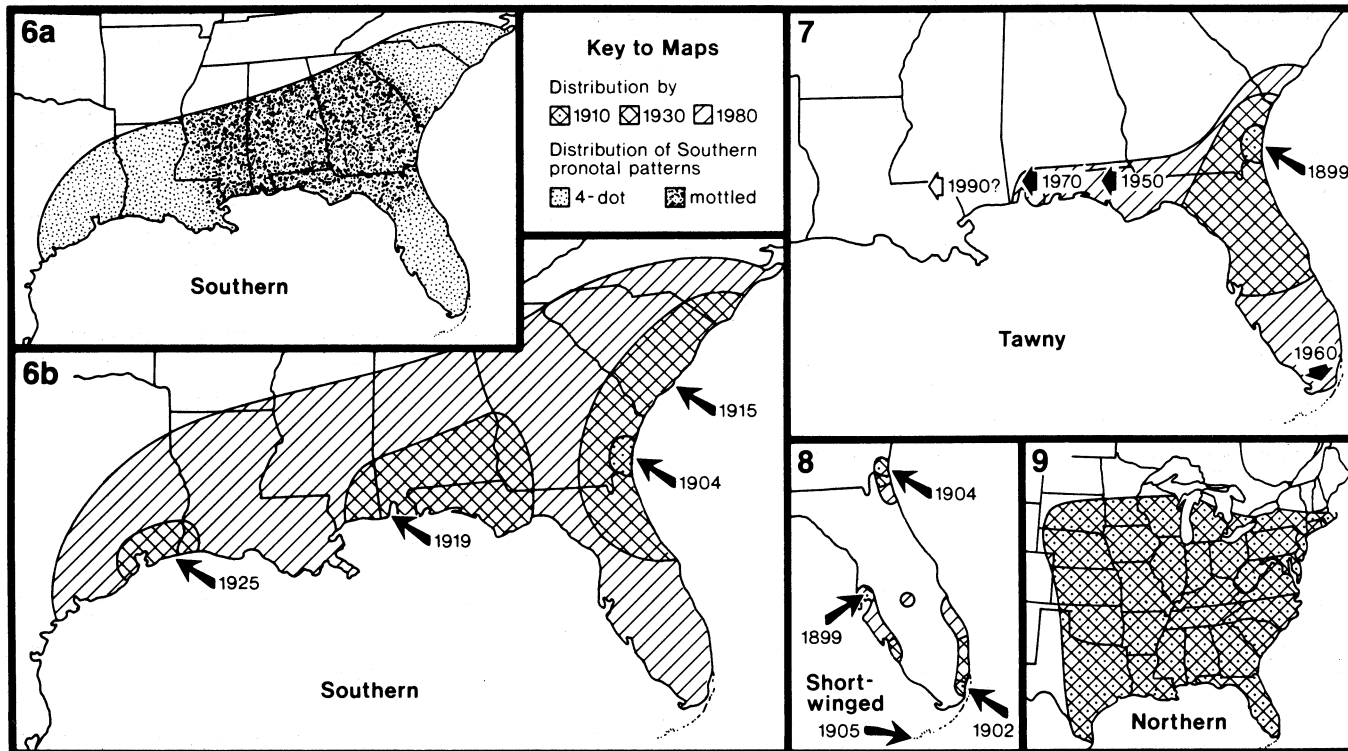


Fig. 6-9. Distribution of southeastern mole crickets and history of spread of pest species.

arranged in a trapezoid (Figs. 5a and 1a). The present distribution of mottled and four-dot forms is concordant with the original introductions except that peninsular Florida is occupied by the four-dot form (either through spread southward along the coast from Charleston or from an independent introduction at Jacksonville around 1924) (Fig. 6a).

The exact origin of the Southeast's mole crickets is uncertain, but the ports of Montevideo, Uruguay, and Buenos Aires, Argentina, seem likely. Tawny and southern mole crickets are widespread in northern Argentina, Uruguay, and southern Brazil. (Neither occurs in the West Indies, although until recently the tawny mole cricket was known as "Puerto Rican mole cricket" or "changa.")

Life cycles

Mole crickets spend nearly all their lives underground. They begin as eggs laid in clutches in underground chambers. The hatchlings soon tunnel to the surface and feed in the upper soil and litter. During the subsequent juvenile and adult stages, the crickets make and occupy extensive tunnel systems. The number of juvenile stages (separated by molts) has not been studied, but there are at least 6 or 7 stages. All juvenile stages resemble adults but lack wings (Fig. 2b) until the last two juvenile stages, when noticeable wing buds appear. Adult males differ from females in having their forewings specialized for calling. The easiest-to-spot distinguishing feature of males is a harp-shaped resonating cell (Fig. 2a).

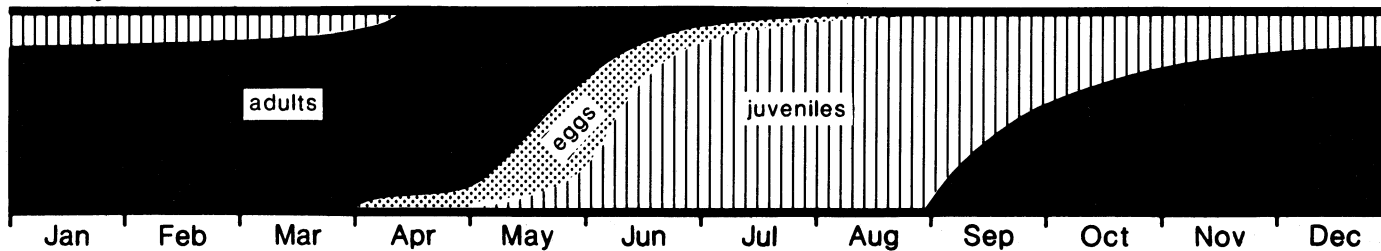
From central Florida northward, tawny and southern mole crickets have one generation each year. Most individuals of the former species overwinter as adults, and most of the latter species overwinter as large juveniles (Fig. 10). In southern Florida the tawny mole cricket maintains its one-year life cycle (as in Fig. 10) but the southern mole cricket has two generations annually. Geographical variation in the seasonal timing and number of annual generations is evident from peaks of flight activity of adults (Fig. 11).

The life cycle of the short-winged mole crickets is not as well understood. Apparently all stages occur at all seasons but with a peak of egg laying in late spring or summer and a lesser peak in winter.

Dispersal

Tawny and southern mole crickets sometimes fly in enormous numbers. Their flights apparently serve two functions: (1) local

Tawny mole cricket



Southern mole cricket

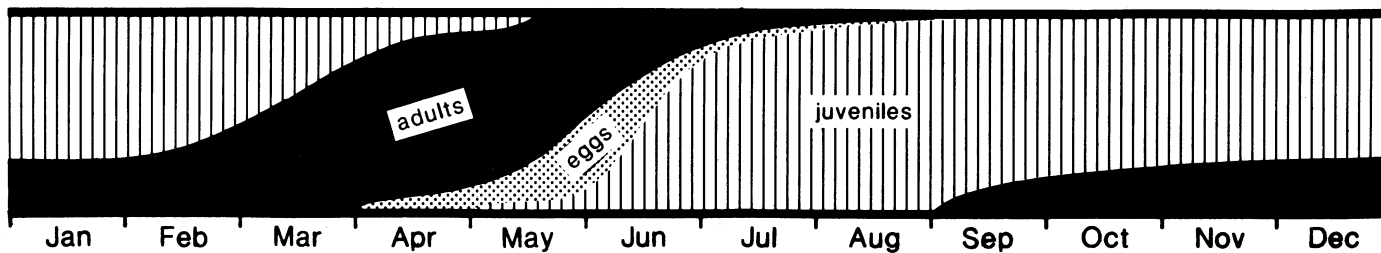


Fig. 10. Seasonal distribution of stages of tawny and southern mole crickets in northern and central Florida. Note the difference between the two species in the proportion of overwintering crickets that are juveniles.

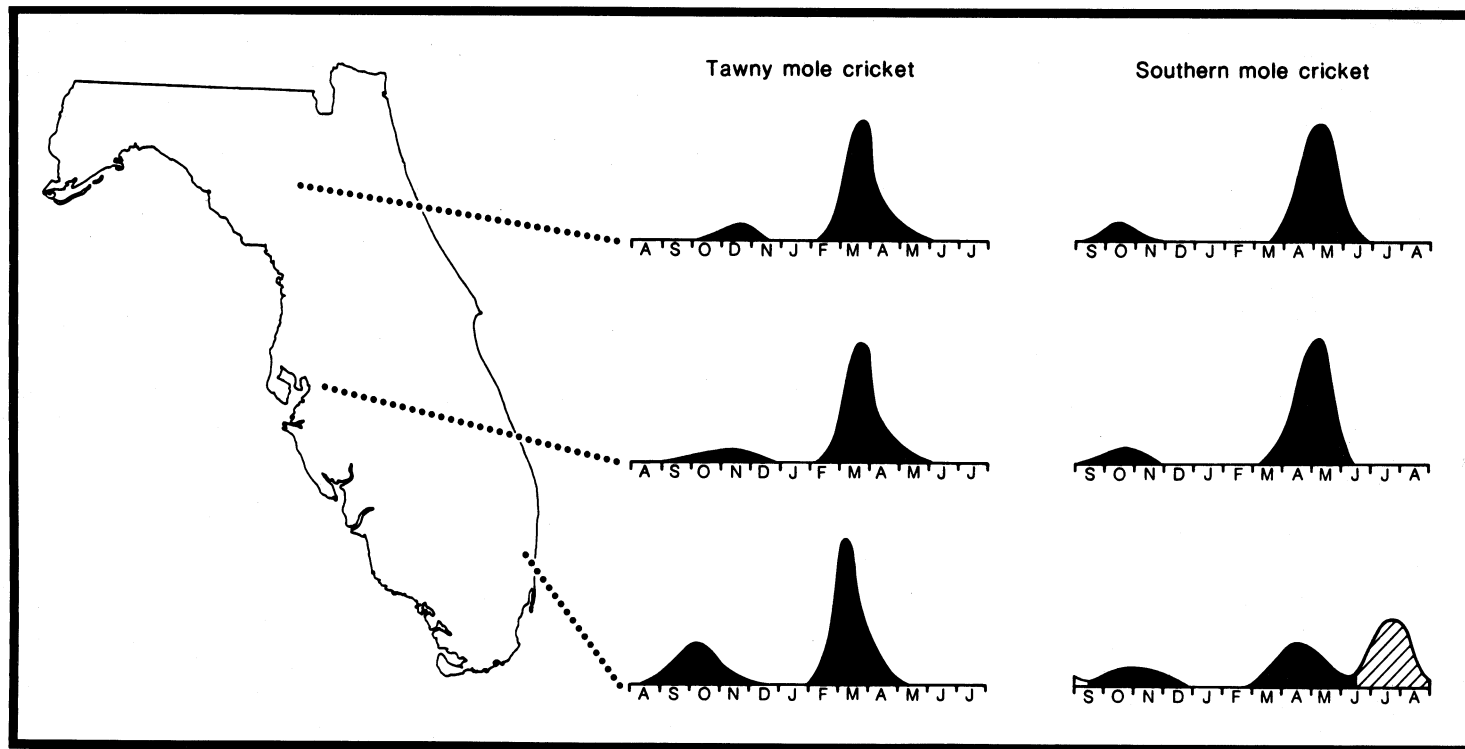


Fig. 11. Seasonality of mole cricket flights in northern, central, and southern Florida. Small fall flights precede larger spring flights of adults of a single generation (Fig. 10). In southern Florida, summer flights of southern mole crickets represent a second generation of adults (hatched area).

searching for mates and new egg-laying or calling sites (see next section) and (2) long range dispersal.

Evidence for dispersal flights can be found in the range expansion of the two species since their introduction (Figs. 6, 7). More direct proof of such flights is the large numbers of mole crickets landing in areas far from where they developed—for example, in extensive woods or on ships offshore. The fact that flying mole crickets are attracted to the calling songs of males of the same species makes possible the use of “sound traps” to sample mole cricket flights over wooded areas as well as over their breeding areas (see p. 19). Calculations based on such samples yield estimates that 10 to 20% of southern mole cricket flights and 40% or more of tawny mole cricket flights are beyond the bounds of the breeding area of origin.

Flight range is uncertain, but marked mole crickets have been recovered up to 3.8 km (2.4 miles) from the point of release. Maximum flight distances are surely farther. The economic impact of dispersal flights is that areas freed of mole crickets are rapidly reinfested and newly cleared land quickly acquires an inoculum of mole crickets.