the double enucleation technique was used.

So far, there does not exist a normal adult frog unequivocally derived from the transplantation of the nucleus of a differentiated cell. In the experiments of Gurdon *et al.* (*3*) the ultimate stage of development was similar to the one we recorded.

With the provision that we do not know the number of genes necessary to code for an animal developed as far as described, we conclude that differentiated cells such as lymphocytes from adult frogs can express the set of genes necessary for tadpole development.

For immunologists, tadpoles old enough to be assayed for their immunological responsiveness could provide a way to examine the genetic potential of a single lymphocyte. Since any somatic changes will be "frozen" in the newly arisen animals, we believe that such lymphocyte-derived tadpoles may be a useful model to approach the problem of antibody diversity, as well as the phenomenon of allelic exclusion and the possible occurrence of somatic translocation or recombination in the genetic regions coding for immunoglobulins.

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Acoustically Orienting Parasitoids: Fly Phonotaxis to Cricket Song

Abstract. *Larviparous female tachinid flies are attracted to taped cricket songs. In the laboratory flies deposit larvae on a cricket mounted to a speaker; the larvae burrow through the cricket's exoskeleton and develop internally. These acoustically orienting parasitoids probably influence male reproductive behavior and sexual competition in crickets.*

Although it has long been considered possible that some predators could locate prey by using the acoustical signals of the prey, Walker (*1*), working with domestic cats, has provided what is, to my knowledge, the only demonstration that a predator can orient acoustically to singing prey. I here report a parasite that locates a host by using the song of the host.

During the summers of 1974 and 1975 I observed that a tachinid fly, *Euphasiopteryx ochracea*, was attracted to the tape-recorded song (*2*) of the field cricket *Gryllus integer*. I collected 11 flies on two nights in 1974 and 87 flies during a 14-night period in 1975 (*3*). Dissection of 35 flies showed that all were females and that each contained living larvae.

To observe fly behavior more closely and to demonstrate the phonotactic response of the flies, I released living flies one at a time into a box measuring 0.8 by 0.8 by 1.2 m. The box was lined with acoustical tile, and I observed the flies through a window in the box. On the floor of the box were two speakers, each with a dead cricket attached (*4*). Cricket songs were played over one speaker while various control sounds (*5*) were played over the other. Both types of sound were produced at the

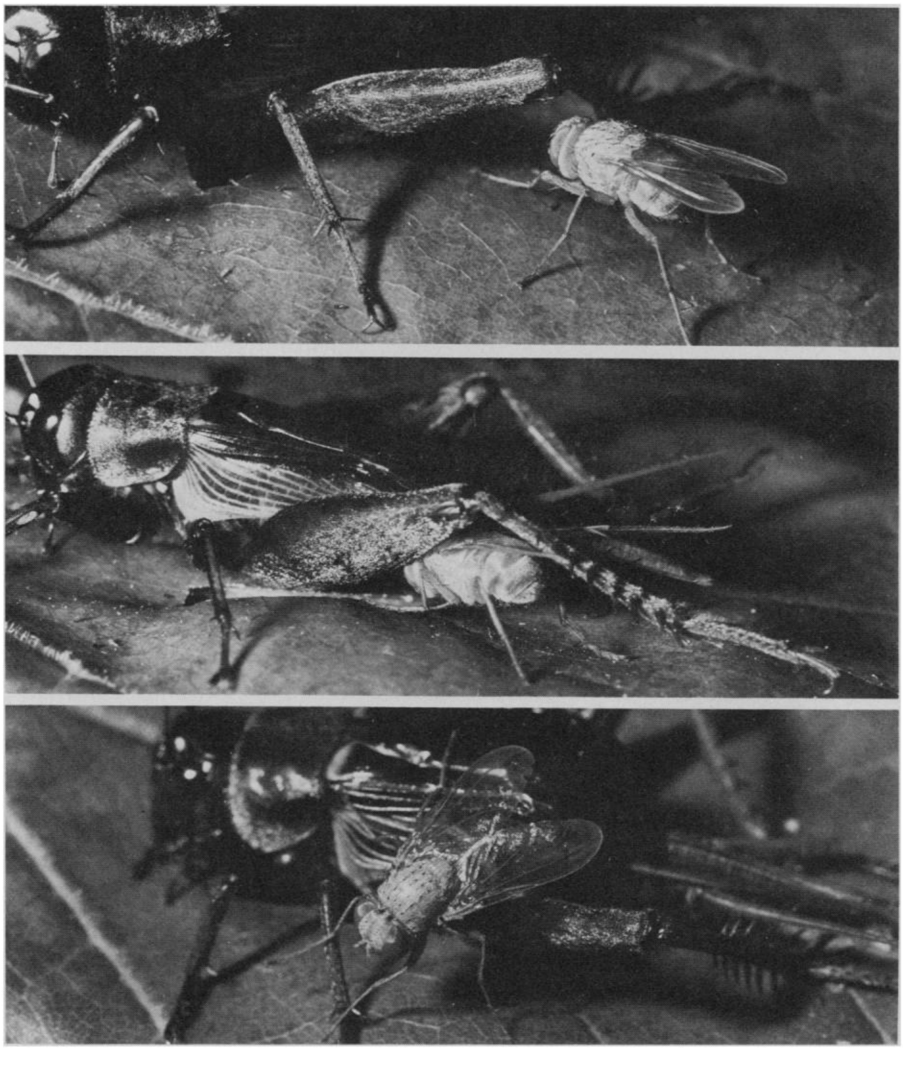

Fig. 1. Views of a fly (*Euphasiopteryx ochracea*) approaching and attacking a dead cricket (*Gryllus integer*) mounted on the top of a speaker that is producing cricket song. This fly measured 7 mm in length.

same intensity (*6*) and within the range observed for *G. integer*. Both sounds were played simultaneously for 1-minute periods, and information was recorded on the time from the start of a trial until the fly reached a speaker and the total time (*7*) spent by a fly on each speaker (Table 1).

After approaching a cricket mounted on a speaker, a fly would always walk quickly around and on the cricket (Fig. 1). After each trial I removed the fly, speaker, and cricket from the box, and in every case I found fly larvae on the cricket and on the surface of the speaker. Larvae on a cricket crawled across the surface of the cricket and burrowed into it.

Larvae deposited on the surface of a speaker stood on their posterior ends and waved the pointed anterior ends in the air. These larvae easily adhered to any surface with which they were brought into contact. I observed a live tethered cricket walking across a speaker containing fly larvae. I then examined the cricket and found several larvae attached. By depositing larvae in the area around a singing cricket, a fly might parasitize other crickets attracted by that cricket's song.

Sabrosky (*8*) reviewed the evidence on host relationships in *Euphasiopteryx* and concluded that these flies probably parasitize nocturnal Orthoptera (*9*). I infected 40 crickets by placing on them larvae that had already been deposited by the flies. These crickets produced 28 pupae from which 11 adult flies were reared (*10*).

While two flies were in the acoustical box, the song of another cricket species was played (*11*). Both flies were attracted to this cricket song, an indication that this fly has not specialized on a single cricket species. Supporting this hypothesis, Walker and Mangold (*12*) have recently observed the attraction of *E. ochracea* to the tape-recorded song of the mole cricket *Scapteriscus acletus*, and have raised adult flies from artificially infected *S. acletus* and *Gryllus rubens* males in Florida.

Walker (*1*) discussed the evolutionary aspects of acoustically orienting predators. He suggested that song characteristics such as irregularity, duration, time of singing, and others could be influenced by selective pressures resulting from acoustically orienting predators. Walker (*13*) also suggested that such pressures may be responsible in part for the occurrence of noncalling cricket species. Acoustically orienting parasites should also produce counteradaptations in their hosts.

The presence of acoustically orienting flies may influence the behavior of *G. integer* males observed in the field (*14*). For most of the night, cricket aggregations are composed of calling as well as noncalling males. Noncalling males, termed satellites, walk in the area occupied by calling males and attempt to intercept and copulate with females attracted by the calling males. In the hours just before sunrise, the number of singers increases as some satellites begin to sing.

Table 1. Fly phonotaxis within an acoustical box (*7*).

Fly No.	Time to first speaker (seconds)	Total time on speakers (seconds)	
		Cricket song	Control sound
1	8	34	0
2	5	21	0
3		0	0
4	4	16	0
5	11	27	0
6	14	23	0
7	8	27	0
8	3	20	0
9	5	48	0
10	12	18	0

Flies are attracted to taped cricket song during the hours when some satellites sing. I collected calling and noncalling male crickets and examined them for fly larvae. Of 11 calling males 9 had larvae deposited on them, whereas only 1 of 17 noncalling males had been parasitized ($\chi^2 = 16.8, P = < .002$). Satellite males apparently experience a lower incidence of parasitism by not singing, at least for a portion of the night. Soper *et al.* (*15*) describe *Colcondamyia auditrix*, a previously unidentified species of sarcophagid fly, and note that this fly orients acoustically to cicada song. Male cicadas, once parasitized, are rendered incapable of producing song; as a result, multiple parasitism is limited and parasitized cicadas are prevented from attracting females acoustically. Acoustically orienting parasites probably exert selective pressures on male reproductive behavior in many animals.

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2. Cricket song was produced by Uher 4000 Report-L tape recorders; Realistic model 40-1228 speakers were used in the field, and model 40-1224 speakers in the laboratory.
3. Fly traps consisting of aluminum screen coverings with funnels projecting inward were fitted to each speaker during 1975.
4. Living crickets were not used because they would move around on the surface of the speaker.
5. Control sounds were a high-frequency whistle for the first five trials and a bullfrog croaking for the second five trials.
6. Sound intensities were measured with a General Radio model 1565-B sound level meter held 6 cm from the speaker.
7. The total time spent by a fly on the speaker from which the cricket song was emanating was usually the result of two or more visits to the speaker.
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Weaning and Growth of Artificially Reared Rats

Abstract. *The importance of suckling experience for later feeding in the rat was tested by means of an isolate rearing technique that eliminated oral feeding. Pups reared in the nearly complete absence of suckling and feeding ate and drank at weaning and then grew normally. Furthermore, the characteristics of apparently normal ingestion and growth make the artificially reared rat a useful preparation for other developmental investigations.*

Despite demonstrations that characteristics of mothers' milk can influence the food preferences of weanling rats (*1*), the importance of the preweaning suckling experience for the normal development of feeding is not known. Does adult ingestion emerge at weaning, independent of nursing experience; or must the pup participate in the behavioral transitions of suckling (*2*) and weaning (*3*) in order that normal feeding occur? An understanding of the contribution of suckling to later feeding has been hampered by the technical difficulty in manipulating suckling experience. Using a simple and practical technique for directly assessing this contribution, I now report that rats reared in the nearly complete absence of suckling and feeding are indistinguishable from normally reared siblings in their initial responses to food at weaning and in their postweaning growth. The feeding experiences of the suckling period, therefore, do not appear necessary for food recognition and ingestion at weaning, or for near normal growth after weaning.

Previously reported methods for hand-rearing rat pups (*4, 5*) were not suitable for this investigation because these hand-feeding techniques provide pups with oral experience which may contribute to learning